

zenith



SERVICE MANUAL

Product Type: Digital Rear Projection
Chassis: ZP26/28
Manual Series: PV154
Manual Part #: 923-03506
Model Line: E
Product Year: 2002

Model Series:

R50V26
R56W28
R60V26
R65W28

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Huntsville, Alabama 35824-1513

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PRODUCT SAFETY SERVICING GUIDELINES FOR AUDIO-VIDEO PRODUCTS

IMPORTANT SAFETY NOTICE

This manual was prepared for use only by properly trained audio-video service technicians.

When servicing this product, under no circumstances should the original design be modified or altered without permission from Zenith Electronics Corporation. All components should be replaced only with types identical to those in the original circuit and their physical location, wiring and lead dress must conform to original layout upon completion of repairs.

Special components are also used to prevent x-radiation, shock and fire hazard. These components are indicated by the letter "x" included in their component designators and are required to maintain safe performance. No deviations are allowed without prior approval by Zenith Electronics Corporation.

Circuit diagrams may occasionally differ from the actual circuit used. This way, implementation of the latest safety and performance improvement changes into the set is not delayed until the new service literature is printed.

CAUTION: Do not attempt to modify this product in any way. Never perform customized installations without manufacturer's approval. Unauthorized modifications will not only void the warranty, but may lead to property damage or user injury.

Service work should be performed only after you are thoroughly familiar with these safety checks and servicing guidelines.

GRAPHIC SYMBOLS



The exclamation point within an equilateral triangle is intended to alert the service personnel to important safety information in the service literature.



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the service personnel to the presence of noninsulated "dangerous voltage" that may be of sufficient magnitude to constitute a risk of electric shock.



The pictorial representation of a fuse and its rating within an equilateral triangle is intended to convey to the service personnel the following fuse replacement caution notice:

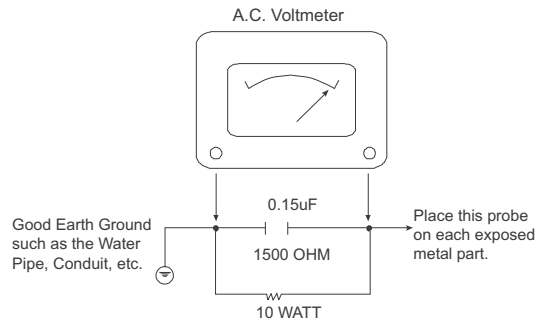
CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ALL FUSES WITH THE SAME TYPE AND RATING AS MARKED NEAR EACH FUSE.

SERVICE INFORMATION

While servicing, use an isolation transformer for protection from AC line shock. After the original service problem has been corrected, make a check of the following:

FIRE AND SHOCK HAZARD

1. Be sure that all components are positioned to avoid a possibility of adjacent component shorts. This is especially important on items transported to and from the repair shop.
2. Verify that all protective devices such as insulators, barriers, covers, shields, strain reliefs, power supply cords, and other hardware have been reinstalled per the original design. Be sure that the safety purpose of the polarized line plug has not been defeated.
3. Soldering must be inspected to discover possible cold solder joints, solder splashes, or sharp solder points. Be certain to remove all loose foreign particles.
4. Check for physical evidence of damage or deterioration to parts and components, for frayed leads or damaged insulation (including the AC cord), and replace if necessary.
5. No lead or component should touch a high current device or a resistor rated at 1 watt or more. Lead tension around protruding metal surfaces must be avoided.
6. After reassembly of the set, always perform an AC leakage test on all exposed metallic parts of the cabinet (the channel selector knobs, antenna terminals, handle and screws) to be sure that set is safe to operate without danger of electrical shock. DO NOT USE A LINE ISOLATION TRANSFORMER DURING THIS TEST. Use an AC voltmeter having 5000 ohms per volt or more sensitivity in the following manner: Connect a 1500 ohm, 10 watt resistor, paralleled by a .15 mfd 150V AC type capacitor between a known good earth ground water pipe, conduit, etc.) and the exposed metallic parts, one at a time. Measure the AC voltage across the combination of 1500 ohm resistor and .15 mfd capacitor. Reverse the AC plug by using a non-polarized adaptor and repeat AC voltage measurements for each exposed metallic part. Voltage measured must not exceed 0.75 volts RMS. This corresponds to 0.5 milliamp AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.



X-RADIATION

1. Be sure procedures and instructions to all service personnel cover the subject of x-radiation. The only potential source of x-rays in current TV receivers is the picture tube. However, this tube does not emit x-rays when the HV is at the factory-specified level. The proper value is given in the applicable schematic. Operation at higher voltages may cause a failure of the picture tube or high-voltage supply and, under certain circumstances may produce radiation in excess of desirable levels.
2. Only factory-specified CRT anode connectors must be used.
3. It is essential that the service personnel have available an accurate and reliable high-voltage meter.
4. When the high-voltage circuitry is operating properly, there is no possibility of an x-radiation problem. Every time a chassis is serviced, the brightness should be run up and down while monitoring the high voltage with a meter, to be certain that the high voltage does not exceed the specified value and that it is regulating correctly.
5. When troubleshooting and making test measurements in a product with a problem of excessively high voltage, avoid being unnecessarily close to the picture tube and the high voltage power supply. Do not operate the product longer than necessary to locate the cause of excessive voltage.
6. Refer to HV, B+, and shutdown adjustment procedures described in the appropriate schematics and diagrams (where used).

IMPLOSION

1. All direct view picture tubes are equipped with an integral implosion protection system; take care to avoid damage during installation.
2. Use only the recommended factory replacement tubes.

TIPS ON PROPER INSTALLATION

1. Never install any receiver in a closed-in recess, cubbyhole, or closely fitting shelf space over, or close to, a heat duct, or in the path of heated air flow.
2. Avoid conditions of high humidity such as: outdoor patio installations where dew is a factor, near steam radiators where steam leakage is a factor, etc.
3. Avoid placement where draperies may obstruct venting. The customer should also avoid the use of decorative scarves or other coverings that might obstruct ventilation.
4. Wall- and shelf-mounted installations using a commercial mounting kit must follow the factory-approved mounting instructions. A product mounted to a shelf or platform must retain its original feet (or the equivalent thickness in spacers) to provide adequate air flow across the bottom. Bolts or screws used for fasteners must not touch any parts or wiring. Perform leakage tests on customized installations.
5. Caution customers against mounting a product on a sloping shelf or in a tilted position, unless the receiver is properly secured.
6. A product on a roll-about cart should be stable in its mounting to the cart. Caution the customer on the hazards of trying to roll a cart with small casters across thresholds or deep pile carpets.
7. Caution customers against using a cart or stand that has not been listed by Underwriters Laboratories, Inc. for use with its specific model of television receiver or generically approved for use with TVs of the same or larger screen size.
8. Caution customers against using extension cords. Explain that a forest of extensions, sprouting from a single outlet, can lead to disastrous consequences to home and family.

PRODUCT SAFETY SERVICING GUIDELINES FOR AUDIO-VIDEO PRODUCTS

CRT ANODE HIGH VOLTAGE MEASUREMENT PROCEDURE

To prevent possible exposure to radiation caused by excessive CRT Anode voltage, the High Voltage Shutdown circuit senses the level of flyback pulse from "Flyback Transformer" representative of the actual high voltage on the CRT anode. When this level exceeds a predetermined voltage, the circuit shuts down the horizontal drive, preventing further generation of anode voltage. In this condition, the horizontal drive is "latched" off. The drive will remain off until power (via remote control or front panel) is re-cycled from "Off" to "On".

Critical Safety components (designated with an "X" in the component designator) are designed to operate the CRT at a safe operating Anode voltage and provide proper shutdown thresholds. If replacement of any of these components are deemed necessary, it is important to use original type Zenith replacement components. After replacement is made, confirm proper Anode voltage using the following procedure.

Measurement of the CRT Anode voltage must be performed using a high impedance high voltage meter, with no visible raster on the screen, and operating at nominal horizontal scanning frequency. Connect a strong broadcast signal (or TV signal generator operating at 15.734kHz horizontal scanning rate) to the RF input.

After discharging the CRT, connect a high impedance high voltage meter to the CRT anode. Turn the television "on" and confirm a good signal is being displayed. Reduce Brightness and Contrast settings until the picture is well extinguished. If the voltage reading is higher than the maximum, verify circuit component values and proper operation.

B+ VDC (0 BEAM)	HV NOM KV	HV MAX KV
115 +/- 2%	30.2	30.5

SHUTDOWN TEST PROCEDURE

Equipment needed is a video generator, HV DC meter (0 to 40 KV, high Z), and an external variable power supply (0V to 6VDC @ 5Amps minimum).

To verify the Shutdown Circuit is operating properly, Supply +6V DC to pin 1 of P1407 and ground to Heat sink of Q1413. If there is no raster and set goes into Shutdown, then the Shutdown Circuit is functional. If the set doesn't go into Shutdown, then the Circuit is defective.

ELECTROSTATICALLY SENSITIVE DEVICES

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on the body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as an ESD mat, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.

5. Do not use freon-propelled chemicals. These can generate electrical charge sufficient to damage ES devices.

6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil, or comparable conductive material.)

7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

Caution: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise, seemingly harmless motion, such as the brushing together of your clothing or the lifting of your foot from a carpeted floor, can generate static electricity sufficient to damage an ES device.)

REGULATORY INFORMATION

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: Reorient or relocate the receiving antenna; Increase the separation between the equipment and receiver; Connect the equipment into an outlet on a circuit different from that to which the receiver is connected; Consult the dealer or an experienced radio/TV technician for help.

The presence of the DTV certification mark indicates that this product will successfully receive digital television transmissions that conform to any and all of the video formats described in the ATSC Digital Television Standard.

The responsible party for this device's compliance is:

Zenith Electronics Corporation
201 James Record Road
Huntsville, AL 35824, USA
Digital TV Hotline: 1-800-243-0000

TRADEMARKS USED IN THIS MANUAL

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PRODUCT SAFETY SERVICING GUIDELINES FOR AUDIO-VIDEO PRODUCTS

HOLD-DOWN CIRCUIT INFORMATION

NORMAL CONDITION

In normal condition, the DC voltage at point ③ is approximately 4.88V through pin 1 of P1407 (HV Block). The voltage at point ④ is approximately 4.86V. The voltage of pin 5 of IC404 is lower than the voltage of pin 6 (5.1V). The voltage of pin 7 is 0V and the transistor Q403 is off.

ABNORMAL CONDITION

In abnormal condition, the voltage of point ④ is much higher than normal voltage. The voltage of pin 5 of IC404 is 24V and the transistor Q403 is on. Therefore, pin 1 of IC401 receives a voltage causing the hold-down circuit to be active. This results in the frequency of the horizontal oscillation and deflection to be stopped and then the set goes into stand-by mode.

X-RAY PROTECTION

Check the X-Ray protection circuit using the following steps. Turn the set on and input a color bar signal. Check the B+ voltage to make sure it is correct. If B+ is 148 to 160 VDC, the power circuit is defective. To check the operation of the hold-down circuit, apply DC 6V (+/- 0.5) to point ③. If there is no raster, the set is operating properly and doesn't need to be repaired.

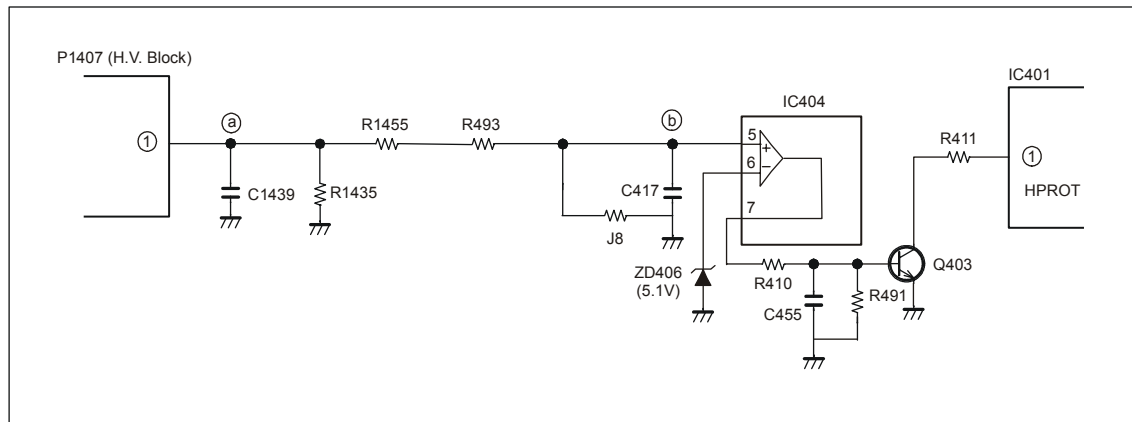


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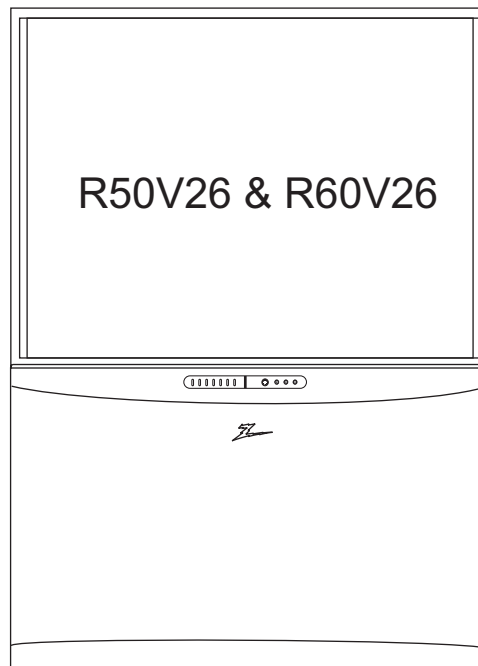
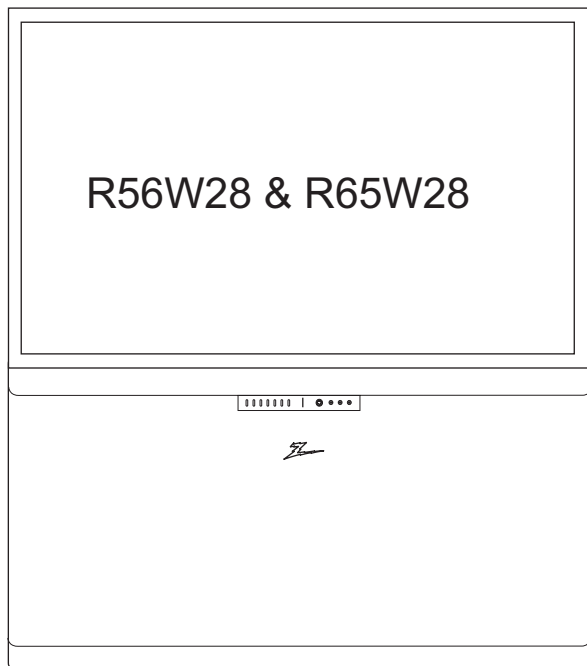
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OVERVIEW

OVERVIEW



The R56/65W28 and R50/60V26 are HDTV Monitors. This means that most of the components of a HDTV are present except for the ASTC tuner. An HDTV receiver or converter box is required to view an ASTC signal. The W28 models feature a 16:9 aspect ratio screen. But, it can display video in several different aspect ratios, including 16:9 and 4:3. More features and specifications are listed below.

Currently the ZP-26/28 chassis is module level repair only. Schematics and PCB layouts are provided to assist in troubleshooting. Follow the normal procedures required for module level repair.

FEATURES

ENHANCED HD LENS SYSTEM

New 4 Element enhanced lens system improves brightness and focus over the previous 25 series and provides a more natural looking and true-to-life picture.

HD FOCUS (W28 MODELS)

Automatic system that eliminates the need to manually adjust the picture. Simply select HD focus from the onscreen set-up menu, and in approximately 8-10 seconds, over 8,000 points on the screen are adjusted, for perfect center to edge focus of the image.

DIGITAL FOCUS ARRAY (V26 MODELS)

New advanced convergence technology is more accurate than previous digital convergence, and is set at the factory by a computer. The 9-Point system actually looks at 117 points, since it interpolates between points, yielding an image that is sharp from center to edge.

IMPROVED-HD DRIVER

Most HDTVs use upconversion of analog signals (line-doubling) to simulate an HD picture, which introduces artifacts that appear as pixilated scenes due to digital conversion. Improved-HD dramatically improves this process and produces images free from picture artifacts by increasing both vertical and horizontal resolution. True HD signals are not affected by this process, leaving them as true to life as possible.

IMPROVED PICTURE

Zenith's 26 and 28 series projection televisions feature a .52mm screen pitch, improved image scaling, and new 7" CRTs yielding sharper images and finer detail. This represents significant improvement compared to our previous 94/95/25 series. The screen also features a scratch resistant coating.

3:2 PULLDOWN DETECTION

Most movies are shot on film, and film operates at a frame rate of 24fps (frames per second), compared to video which operates at 30fps, 3:2 pulldown properly detects and syncs film to video for smooth theater like pictures at home.

OVERVIEW

R50/60V26 SPECIFICATIONS

VIDEO

Picture Tubes 7" LFM
Resolution Display 540p or 1080i
Mirror 1st Surface Glass
Lens System Enhanced HD
Tuning System NTSC + Up Converter
Scan Velocity Modulation Advanced SVM
Dynamic Focus Yes
Digital Convergence 9-Point Digital
Color Temperature Cool/Warm/STD
Comb Filter Digital 3D Y/C
Horizontal Lines Resolution 1200
Picture In Picture (PIP) 2 Tuner
Advanced features .. Light Sentry, Detail Enhance, Super Contrast, Gamma Correction, Auto Flesh Tone, Wide Band Video Amp

AUDIO

Front Surround (SRS) Yes
Mono/Stereo/MTS/SAP MTS/SAP
Bass/Treble/Balance (Tone Control) Yes
Total Audio (Watts) 24W (2 x 12W)
Auto Noise Cancel Yes
Audio Boost Loudness

SPECIAL FEATURES

HD Monitor Digital Display
Displays Digital Signals at 540p or 1080i (User Selects)
Tri-lingual Menus English, Spanish, French
Other features .. Icon Menus, Source ID, Channel Labels, Parental Control with V-Chip, On/Off Timer, Flashback, CC, CC When Mute, 2 Level Mute, Channel Review, Channel Skip, Power Resume, On/Off Speaker Selection, Date/Time/Channel

CABINET

Dimensions and weight:
R50V26: 43.5"w x 52"h x 23.5"d @177Lbs
R60V26: 51.5"w x 60.5"h x 26.5"d @226Lbs
Finish Light Silver
Screen Protector High Contrast
Swivel/Casters Casters
Control Panel Escut. (Buttons) 8

REMOTE CONTROL

Transmitter Universal Remote w/Glow Channel & Volume

Model Number MBR5045

APPROVALS

UL, C-UL, NOM UL, C-UL

UPC Code 50":04464200642 6
60":04464200632 7

SERVICE/LIMITED WARRANTY

Service Support Level "M" Module Level
Warranty: Parts/CRT/Labor 1 Year/2 Years/1 Year

R56/65W28 SPECIFICATIONS

VIDEO

Picture Tubes 7" LFM
Resolution Display 540p or 1080i
Mirror 1st Surface Glass
Lens System Enhanced HD
Tuning System NTSC + Up Converter
Lens Elements 4
Lens Filters Red & Green Color Purity
Screen w/Surface Diffuser 160° Viewing Angle
Scan Velocity Modulation Advanced SVM
Dynamic Focus Yes
Digital Convergence 9-Point Digital
Picture In Picture (PIP) Yes
Picture Outside Picture (POP) 3/Split Screen
Color Temperature Cool/Warm/STD
Black Level Exp./White Level Compression NTSC Fixed
Home Theater Mode TV, Movie, Sports, Music, Reset
Comb Filter Digital 3D Y/C
Horizontal Lines Resolution 1200
Picture In Picture (PIP) 2 Tuner
Aspect Ratio Normal, Wide, Panoramic, Zoom
Advanced features .. Light Sentry, Detail Enhance, Super Contrast, Gamma Correction, Auto Flesh Tone, Wide Band Video Amp

AUDIO

Front Surround (SRS) Yes
Mono/Stereo/MTS/SAP MTS/SAP
Bass/Treble/Balance (Tone Control) Yes
Total Audio (Watts) 24W (2 x 12W)
Auto Noise Cancel Yes
Audio Boost Loudness

OVERVIEW

SPECIAL FEATURES

HD Monitor Digital Display Displays Digital Signals at 540p or 1080i (User Selects)

Tri-lingual Menus English, Spanish, French

Other features .. Icon Menus, Source ID, Channel Labels, Parental Control with V-Chip, On/Off Timer, Flashback, CC, CC When Mute, 2 Level Mute, Channel Review, Channel Skip, Power Resume, On/Off Speaker Selection, Date/Time/Channel, Energy Star®

APPROVALS

UL, C-UL, NOM UL, C-UL

UPC Code 56":04464200622 8
65":04464200612 9

SERVICE/LIMITED WARRANTY

Service Support Level "M" Module Level

Warranty: Parts/CRT/Labor 1 Year/2 Years/1 Year

CABINET DESCRIPTION

Dimensions and weight:

R56W28: 54.1"W x 52.21"H x 24.2"D

R65W28: 60.01"W x 62.01"H x 26.3"D

Finish Light Silver

Screen Protector High Contrast

Swivel/Casters Casters

Control Panel Escut. (Buttons) 8

REMOTE CONTROL

Transmitter Universal Remote w/Glow

Model Number MBR5045

ON SCREEN DISPLAY

RATING BROADCAST

Displays the rating for the program currently being broadcast.

AUDIO SELECTED

Displays signal's audio setting.

AUDIO BROADCAST

Displays signal's audio broadcast.

CHANNEL SKIP

Shows that Channel Skip is active.

SECURITY TIMER

Displays time that TV is set to turn off.

SLEEP TIMER SET

Displays time left on Sleep Timer before TV shut off.

STEREO
ST / SAP TV - PG DLSV

C. SKIP (C. S.)
OFF 10:05 AM
SLEEP 0:01

ANT 1 110
ABC
10 : 00 AM
May 14 2002

STEREO ST / SAP TV - PG DLSV
ANT 1 110 ABC
10 : 00 AM
May 14 2002
PIP ANT 1 14
SMP (C. S.)
OFF 10:05 AM
SLEEP 0:01
TV Normal

TV
Normal

MAIN PICTURE SOURCE
Displays Main Picture Source (Active source highlighted).

CHANNEL LABEL
Displays channel label you have chosen.

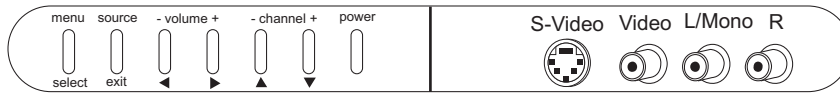
TIME
Displays clock setting.

MONTH/DATE/YEAR
Shows current month, date, and year.

PICTURE FORMAT
Shows current Theater mode setting.

OVERVIEW

FRONT CONNECTIONS



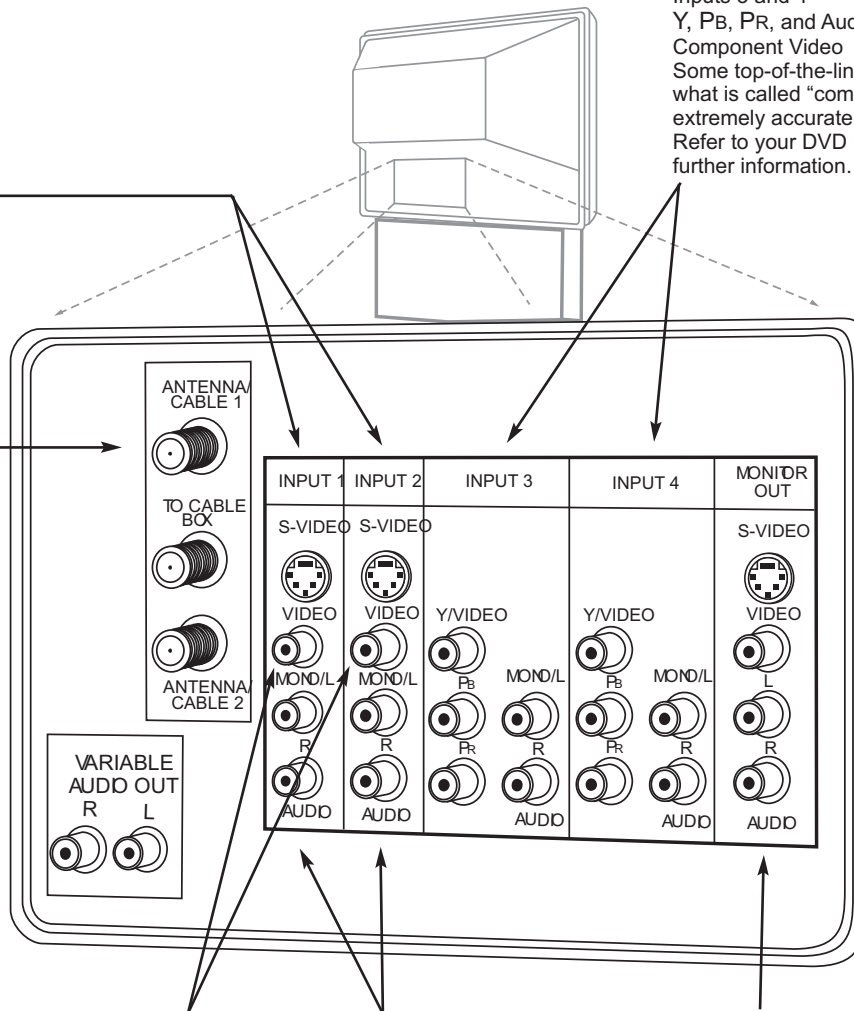
REAR CONNECTIONS

Inputs 3 and 4
Y, PB, PR, and Audio L - R
Component Video
Some top-of-the-line DVD players use what is called "component video," for extremely accurate picture reproduction. Refer to your DVD manual for further information.

S-Video Input 1 and 2
Connections available for some high-end equipment that provides even better picture quality.

RF Connectors:
Antenna/Cable 1,
Antenna/Cable 2,
and Cable Box
Used to connect cable service to the television, either directly or through your cable box.

Variable Audio Out
Used to connect either an external amplifier or add a sub-woofer to your surround sound system.



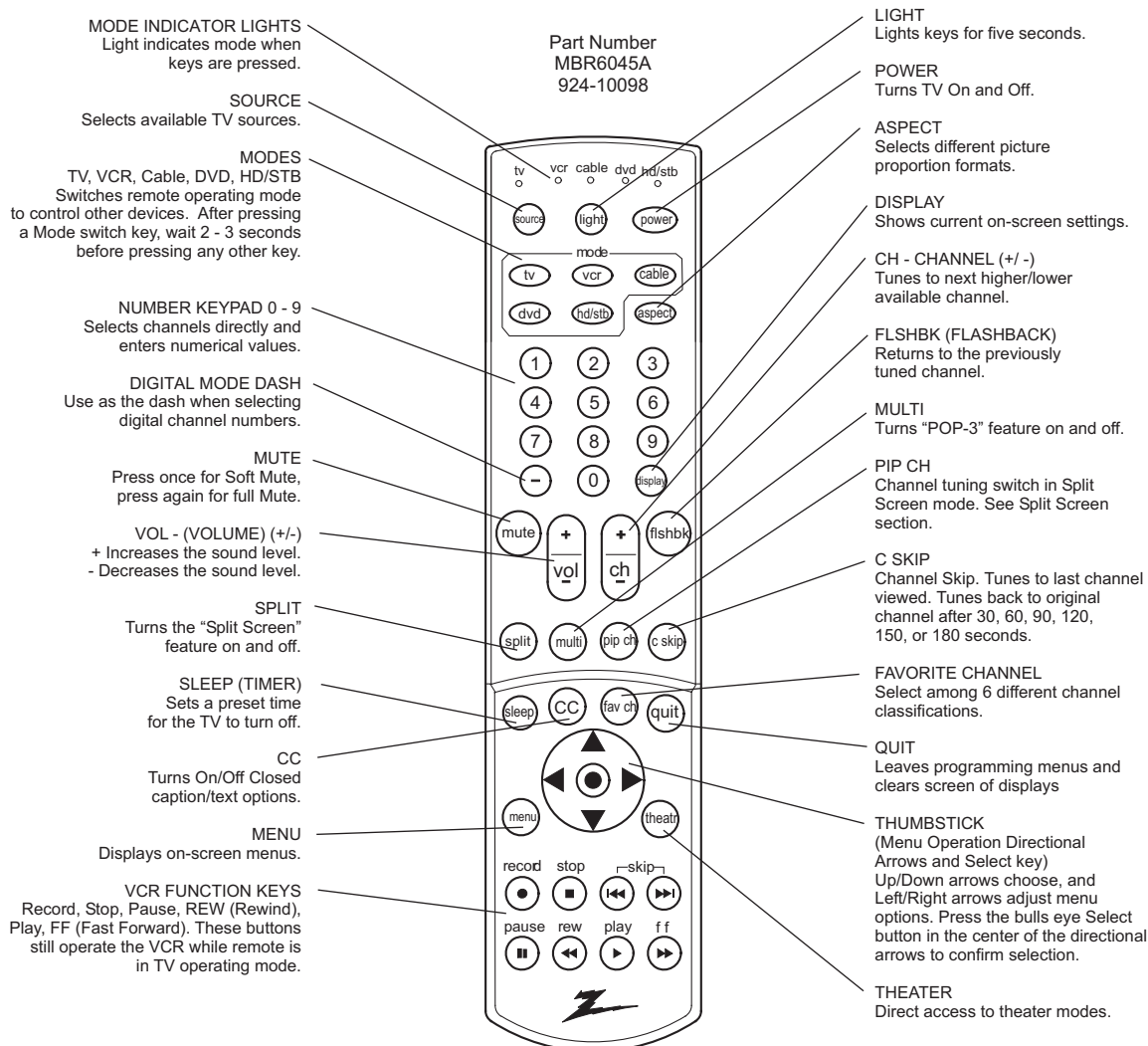
Video 1 or 2
Connects the video signals from various types of equipment.

Right/Left Audio
Used for stereo sound from various types of equipment.

Monitor Out
These jacks provide fixed audio and video signals which are used for recording. Use S-Video Output for high quality video output.

REMOTE CONTROL

REMOTE BUTTON DESCRIPTIONS



PROGRAMMING THE REMOTE

If you're using Zenith products, the remote is already programmed for most common codes. For other brands, or if your remote fails to control your Zenith products, you'll have to program the remote.

Make sure the batteries are installed and follow these steps for each product:

1. Turn on the device to be operated.
2. Press and hold the device button until the indicator light turns on, continue holding down the device button.
3. Now the remote control is ready to program the code for the corresponding component. Enter the product's code number using the number buttons. Code numbers can be found on the following pages. The indicator light will flash three times and turn off if the code was accepted.

4. Release the mode key. Point the remote at the device and press the POWER key. The device should turn off. If not, try the other 3-number codes listed.

NOTE: Use the CABLE device button for satellite receivers. Use the DVD device button for home audio components.

REMOTE CONTROL

REMOTE BRAND CODES

TVs

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DVD Players

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Audio CD Players

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Goldstar 460	Optimus 920 921 922	Sony 420 443 444 445 934	
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Audio Tape Decks

Sony 452

Audio Tuners/Amps

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HD/Set Top Boxes


EchoStar 805	Philips 802	Sony 801
Hughes 803	RCA 804	Zenith 800

REMOTE CONTROL

OPERATING MODE KEY FUNCTIONS

KEY NAME	TV Mode	VCR Mode	Cable Mode	DVD Mode	HD/STB Mode
source	TV Sources	TV Sources	TV Sources	TV Sources	TV Sources
light	Lights Keys 5 Seconds	Lights Keys 5 Sec	Lights Keys 5 Sec	Lights Keys 5 Sec	Lights Keys 5 Sec
power	TV On/Off	VCR On/Off	Cable Box On/Off	DVD On/Off	HD/STB On/Off
tv	Selects TV	Selects TV	Selects TV	Selects TV	Selects TV
vcr	Selects VCR	Selects VCR	Selects VCR	Selects VCR	Selects VCR
cable	Selects Cable	Selects Cable	Selects Cable	Selects Cable	Selects Cable
dvd	Selects DVD	Selects DVD	Selects DVD	Selects DVD	Selects DVD
hd/stb	Selects HD/STB	Selects HD/STB	Selects HD/STB	Selects HD/STB	Selects HD/STB/direcTV
aspect	Selects Aspect Ratio Formats	N/A	N/A	N/A	Selects Aspect Ratio Formats
1	TV Digit 1	VCR Digit 1	Cable Digit 1	DVD Digit 1	HD/STB Digit 1
2	TV Digit 2	VCR Digit 2	Cable Digit 2	DVD Digit 2	HD/STB Digit 2
3	TV Digit 3	VCR Digit 3	Cable Digit 3	DVD Digit 3	HD/STB Digit 3
4	TV Digit 4	VCR Digit 4	Cable Digit 4	DVD Digit 4	HD/STB Digit 4
5	TV Digit 5	VCR Digit 5	Cable Digit 5	DVD Digit 5	HD/STB Digit 5
6	TV Digit 6	VCR Digit 6	Cable Digit 6	DVD Digit 6	HD/STB Digit 6
7	TV Digit 7	VCR Digit 7	Cable Digit 7	DVD Digit 7	HD/STB Digit 7
8	TV Digit 8	VCR Digit 8	Cable Digit 8	DVD Digit 8	HD/STB Digit 8
9	TV Digit 9	VCR Digit 9	Cable Digit 9	DVD Digit 9	HD/STB Digit 9
0	TV Digit 0	VCR Digit 0	Cable Digit 0	DVD Digit 0	HD/STB Digit 0
-	N/A	N/A	Cable/Satellite Dash	DVD Zoom	HD/STB Dash
display	TV Display	VCR Memory	N/A	DVD Display	N/A
mute	TV Mute	TV Mute	TV Mute	TV Mute/Sound	TV Mute
volume (up)	TV Volume Up	TV Volume Up	TV Volume Up	TV Volume Up	TV Volume Up
volume (down)	TV Volume Down	TV Volume Down	TV Volume Down	TV Volume Down	TV Volume Down
channel (up)	TV Channel Up	VCR Channel Up	Cable Channel Up	DVD Skip>>	HD/STB Channel Up
channel (down)	TV Channel Down	VCR Channel Down	Cable Channel Down	DVD Skip <<	HD/STB Channel Down
flashbk	TV Flashback	TV Flashback	Cable Flashback	DVD Return	HD/STB Flashback
split	TV Split Screen On/Off	VCR+	Cable/Sat Day Up	DVD Marker	N/A
multi	TV POP-3 Multi On/Off	VCR Search	Cable/Sat Day Down	DVD Repeat a-b	N/A
pip ch	TV Split Screen Channel Tuning Switch	VCR Display	N/A	DVD Marker Search	STB Signal
c skip	Channel Skip	VCR am/pm	N/A	DVD Clear	N/A
sleep	TV Sleep Timer	VCR Timer	Cable/Sat Timer	DVD Repeat Chap	N/A
cc	TV Closed Captions	TV Closed Captions	Cable/Sat Page Up	DVD Sub Title	N/A

REMOTE CONTROL

KEY NAME	TV Mode	VCR Mode	Cable Mode	DVD Mode	HD/STB Mode
fav ch (Channel)	TV Favorite Channels	VCR Channel Map	Cable Page Down	N/A	N/A
quit	TV Menu Quit	VCR Quit	Cable Quit	DVD Resume	HD/STB Quit
up arrow	TV Select Up	VCR Select Up	Cable/Sat Up Arrow	DVD Up Arrow	HD/STB Up Arrow
down arrow	TV Select Down	VCR Select Down	Cable/Sat Down Arrw	DVD Down Arrow	HD/STB Down arrow
left arrow	TV Adjust Left	VCR Tracking Down	Cable/Sat Left Arrow	DVD Left Arrow	HD/STB Left arrow
	Favorite Channels				
right arrow	TV Adjust Right	VCR Tracking Up	Cable/Sat Right Arrw	DVD Right Arrow	HD/STB Right arrow
	Favorite Channels				
Push "Select" 	TV Menu Item Select	VCR Enter	Cable/Sat Enter	DVD Enter	HD/STB Enter
menu	TV Menu	VCR Menu	Cable/Sat Menu	DVD Menu	HD/STB Menu
				Disc Menu	
theater	TV Theater Modes	N/A	Cable/Sat Info	DVD Open Close	HD/STB Info
record	VCR Record	VCR Record	Cable/Sat Buy	DVD Angle	N/A
stop	VCR Stop	VCR Stop	VCR Stop	DVD Stop/Eject	VCR Stop
l<< skip	DVD Skip l<<	DVD Skip l<<	DVD Skip l<<	DVD Skip l<<	DVD Skip l<<
skip >>l	DVD Skip >>l	DVD Skip >>l	DVD Skip >>l	DVD Skip >>l	DVD Skip >>l
pause	VCR Pause	VCR Pause	Cable/Sat Guide	DVD Pause	HD/STB Guide
rew (rewind)	VCR Rewind	VCR Rewind	VCR Rewind	DVD Scan <<	VCR Rewind
play	VCR Play	VCR Play	VCR Play	DVD Play	VCR Play
ff	VCR Fast Forward	VCR Fast Forward	VCR Fast Forward	DVD Scan >>	VCR Fast Forward

Reference: MBR6045, 924-10098

USER MENUS

USER MENUS

SETUP

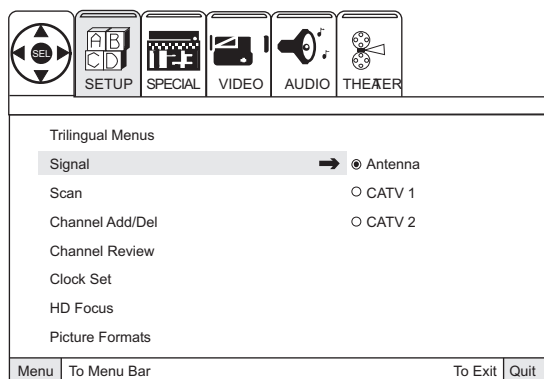
TRILINGUAL MENUS

Press MENU to access the Setup menu. Use the DOWN arrow to choose Trilingual. Press the RIGHT arrow button to activate the Language menu option.

Use the UP/DOWN arrow button to choose your language preference for the on-screen menus, press Select to set and confirm. Press QUIT to exit and save your choice.

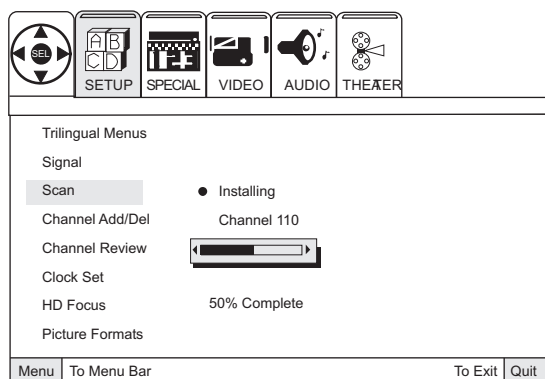
SIGNAL SOURCE

Select Signal using the DOWN arrow button. Activate the Signal Menu option by pressing the RIGHT arrow button. If your signal comes from an outdoor antenna, leave set at ANTENNA. If your signal comes from a cable TV service, select CATV 1 by pressing the DOWN arrow button. Press "select" to set (confirm) your choice, then press the MENU button to return to the Setup Menu. Now scan for available channels.



SCAN

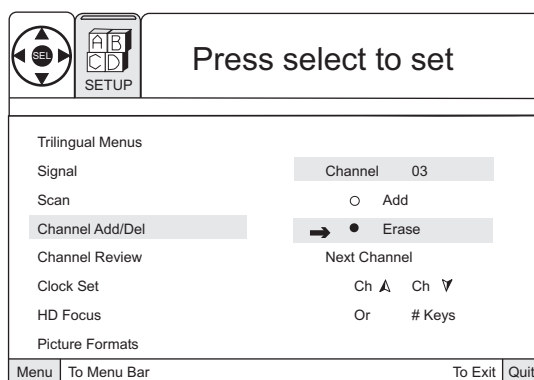
Choose Scan mode by pressing the DOWN arrow button on your remote. Press the RIGHT arrow button to choose Scan. Press the SELECT button on your remote to begin Scan (the channel search).



If certain CATV channels are not received clearly in CATV1 mode, set the source to CATV2 mode.

CHANNEL ADD/DEL (DELETE)

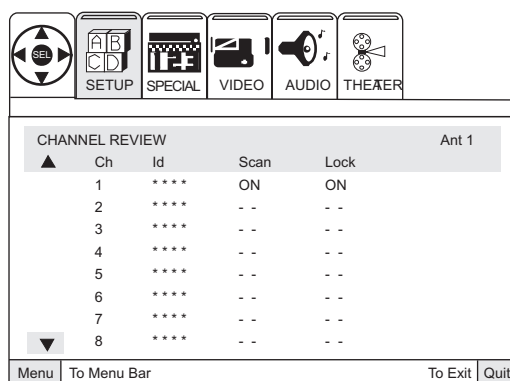
Customize your channel selection list: Add Channels not found by Scan (Channel Search), Delete channels you don't watch. Channels will appear when using Channel Up/Down Press the MENU button on your remote to access the Setup menu.



Use the UP/DOWN arrow to choose Channel Add/Del. Press the RIGHT arrow button to activate the Channel Add/Del menu option. Use the UP/DOWN arrow button to choose the Add or Erase option for the currently chosen channel, press Select to set and confirm your choice. Press QUIT to exit and save your choice or use the Channel UP/DOWN buttons/numbers to choose another channel to Add or Erase.

CHANNEL REVIEW

Use the UP/DOWN arrow to choose the Channel Review option. Use the RIGHT arrow button to activate the Channel Review menu option.

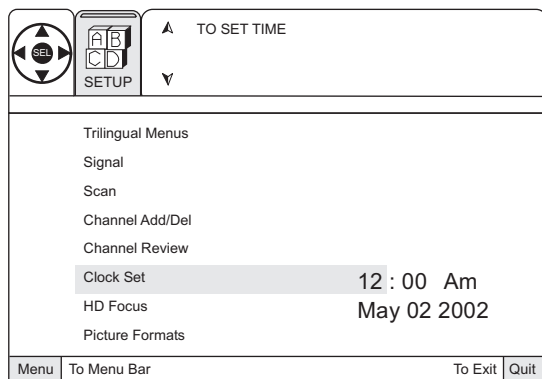


Use the UP/DOWN arrow button to cycle through your channel list and review the settings. (Each press of Up/Down arrows will display the next eight channels.) Press QUIT to exit.

USER MENUS

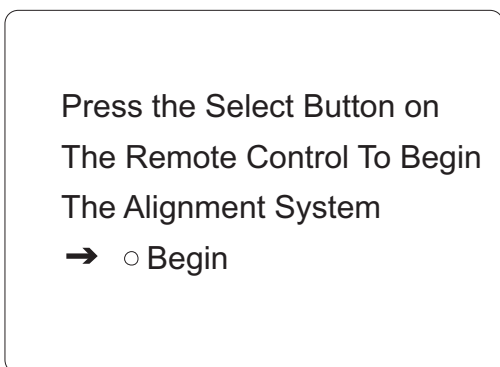
CLOCK SET

Use the UP/DOWN arrow to choose Clock Set. Use the RIGHT arrow button to choose first the time option and use the UP/DOWN arrow buttons to adjust time options. Press the RIGHT arrow button and then use the UP/DOWN arrow buttons to adjust month/date/year options. Press QUIT to save and exit.



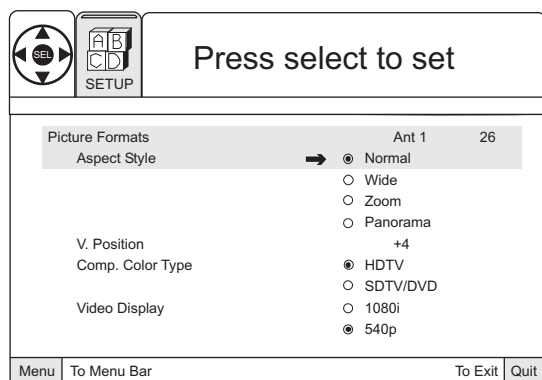
HD FOCUS

Use the UP/DOWN arrow to choose HD Focus. Press the RIGHT arrow button to go to the HD Focus option. Press Select to adjust color convergence automatically.



PICTURE FORMATS

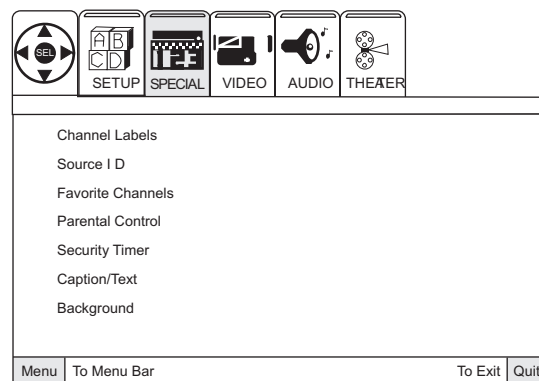
Fine-tune High Definition and standard NTSC analog signal source images.



Use the RIGHT arrow button to access the Picture formats Menu. Choose and set the options based on your equipment's signal requirements for high-definition or standard NTSC sources. Aspect Style: Normal, Wide, Zoom, or Panorama. Vertical Position sets the image's vertical position on screen. Comp. Color Type: HDTV or SDTV/DVD. Video Display: 1080i or 540p. Press SELECT to set and confirm your settings. Press QUIT to save and exit.

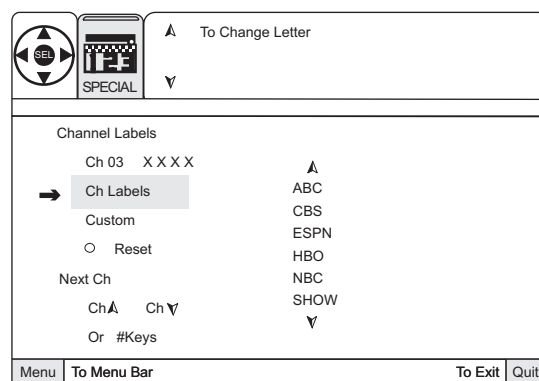
Note: 1080i signal source settings are fixed while other signal source formats are adjustable (1080i=1080i) (TV converts 720p to 540p, 480p to 540p, 480i to 540p.).

SPECIAL



CHANNEL LABELS

Tune to a channel you want to label. Press MENU on your remote and then use the RIGHT/LEFT arrow button to access the Special Menu. Use the UP/DOWN arrow to choose Channel Labels. Press the RIGHT arrow button to activate the Channel Labels option.



At this point you have three options:

- Select a pre-set channel label by choosing Ch Labels.
- Customize a channel label by choosing Custom Ch.
- Delete a channel label entirely by choosing Reset.

USER MENUS

Use the UP/DOWN arrows to choose an option. If you chose Ch Labels, press the RIGHT arrow button to access the preset channel label list and scroll through this list using the UP/DOWN arrow buttons. When you find the appropriate label for the channel, press the SELECT button.

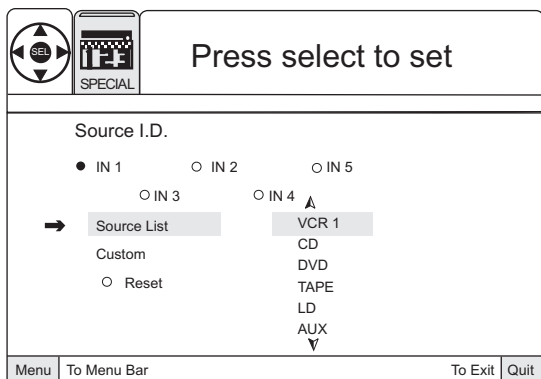
If you select Custom Channel, press the RIGHT arrow button once and then use the UP/DOWN arrow buttons to select individual letters and LEFT/RIGHT arrow buttons to choose placement of letters.

If you wish to delete a channel label, choose Reset using the UP/DOWN arrow buttons and then press the SELECT button on your remote. You will be asked "Are You Sure?" press SELECT again if you are sure.

Use CHANNEL UP/DOWN buttons or the NUMBER KEYPAD and choose another channel to label. Repeat steps for all channels you wish to label. Press QUIT to save and exit.

SOURCE ID

Choose preset names or create your own titles for available picture/sound input sources. Use the UP/DOWN arrow to select Source ID. Press the RIGHT arrow button to activate the Source option. Use the RIGHT arrow button to choose: In 1, In 2, 3, In 4, or In 5 (for front video jacks).



Use the UP/DOWN arrow buttons to go to Source List and choose a pre-set Source identification, Custom to create your own label, or pick Reset to clear all labels.

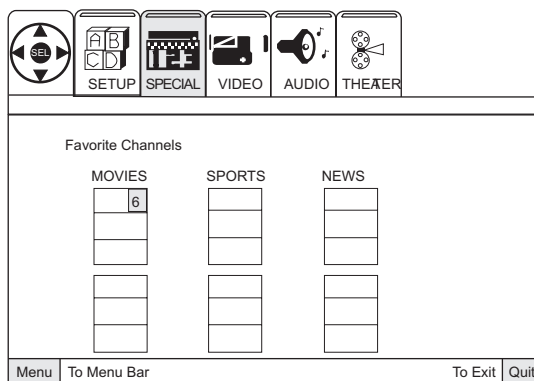
If you chose Source List, press the RIGHT arrow button to access the list and then use the UP/DOWN arrow buttons to pick an ID from the list. Press SELECT to save your choice.

If you wish to customize your source ID, go to Custom and press the RIGHT arrow button. Cycle through the character choices using the UP/DOWN buttons and cycle through the character slots using the RIGHT arrow button. Press QUIT to save your choice and exit.

*Note: Use * for blank spaces.*

To delete a Source ID, select Reset, then press the SELECT button. You will be asked "Are You Sure?" Press SELECT again and then press QUIT to save and exit.

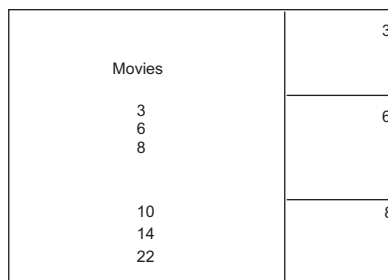
FAVORITE CHANNELS



Group your favorite channels into categories. Use the UP/DOWN arrow to choose Favorite Channels. Press the RIGHT arrow button to activate Favorite Channels option. Use the RIGHT arrow button to choose a Favorite Channels category such as Movies, Sports, News, Sitcom, Music, Custom, or use Up/Down to create your own category.

Once you have chosen a category, press the DOWN arrow button to pick a slot for the Favorite Channel in that category. Use the NUMBER keypad to enter the channel number you want to include in that category. Wait three seconds and the channel number will go into the first inset to the right. Use the UP/DOWN arrow buttons to choose the next channel number entry. Repeat these steps for all categories.

To access your favorite channels categories press the RIGHT arrow button repeatedly while watching TV. Use the UP/DOWN arrow buttons to scroll through the Favorite Channels you have set up. While in Favorite Channels Mode, press the MENU button on your remote and after a short time you will see three channel (Pop-3) still frame insets representing three of the six Favorite channels you have selected for that category to the right of your viewing area.



USER MENUS

Notes

- Favorite Channels are only available on ANT 1 source.
- If Parental Control Ratings are locked, it will disable multiple channel insets (including the Favorite Channels POP-3 insets).
- When POP-3 favorite channel is on, Closed Caption option will not appear.
- If Closed Caption is set to Auto and Mute is on, Favorite Channels cannot be accessed.

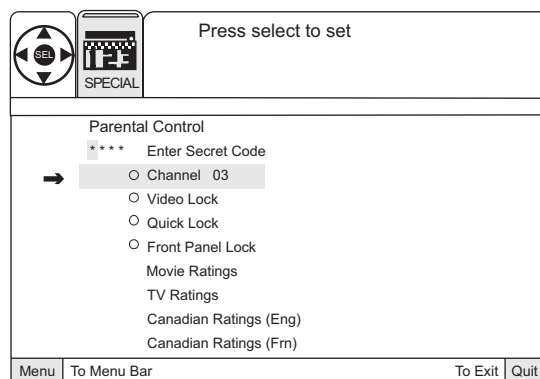
PARENTAL CONTROL

Parental Control offers the user a wide variety of options and settings that restrict or “block” the programming that can appear on the TV. Parental Control allows the user the capability of defining which program rating they consider acceptable, to the younger or more sensitive viewer. It can be preset and turned either on or off by the user who specifies the secret 4-number code, the password.

Viewer ratings are specified for both TV and the motion picture industry; both rating systems should be used for complete coverage. These ratings are based mainly on children’s ages. See the Parental Control menu and submenus example on the next page.

Things to Consider before Setting Up Parental Control View or Block options:

- Determine which rating you consider acceptable to the viewer. (For example, if you choose TV-PG, all more restrictive ratings will be automatically blocked; the viewer will not be able to see: TV-PG, TV-14, or TV-MA rated programming.)
- Do you want to block individual channels or input sources? (Blocks the signal sent by the equipment, such as a VCR, connected to the TV Audio/Video input jacks.) Or leave unblocked, then choose allowable ratings.
- Lock the front panel controls so they cannot be used with the Front Panel Lock option.
- Select a secret password; in the Set Password option. Use the number keys on the remote. Don’t forget the password, it is the only way you can access the Parental Control menu and change rating selections, or turn Parental Control off.



V-CHIP RATINGS

Most television programs and television movies can be blocked by TV Rating and/or Individual Categories. Movies that have been shown at the theaters or direct-to-video movies use the Movie Rating System(MPAA) only.

Movies Ratings:

- * Unblocked
- * G - General audience
- * PG - Parental guidance suggested
- * PG-13 - 13 years and older
- * R - Restricted
- * NC-17 - 17 years and older
- * X - Adult

General TV Ratings:

- * Unblocked
- * TV-G - General audience
- * TV-PG - Parental guidance suggested
- * TV-14 - 14 years and older
- * TV-MA - Mature audience

Children TV Ratings:

- * Unblocked
- * TV-Y - youth
- * TV-Y7 - youth, 7 years and older

Content Categories:

- * Dialog - sexual dialogue (applies to TV-PG, TV-14)
- * Language - adult language (applies to TV-PG, TV-14, TV-MA)
- * Sex scenes - sexual situations (applies to TV-PG, TV-14, TV-MA)
- * Violence (applies to TV-PG, TV-14 and Above, TV-MA)
- * F Violence - fantasy violence (applies only to TV-Y7)
- * No Rating (blocks all viewing)

USER MENUS

SETUP

Press MENU and then the RIGHT/LEFT arrow button to access the Special Menu. Press the UP/DOWN arrow to choose Parental Control and then press the RIGHT arrow button to activate Parental Control. When prompted, enter the default code 7777 from the number keypad. If you wish to change the code, select "Change Secret Code" and enter the new code through the number keypad. If you forget your code, just reenter "7777" to reset to factory preset code.

Use the UP/DOWN arrow button to choose your Block options, press SELECT to confirm your choice:

- Channel: Selects the channel you wish to restrict.
- Video Lock: Selects the Video Inputs to be blocked.
- Quick Lock: Blocks CH3 and CH4 on ANT 1 and 2, as well as all 3 video input jacks.
- Front Panel Lock: Blocks front panel controls from being used. Only Power button will work when this feature is active.

Now you will set the Ratings for the channel you wish to block. Press the UP/DOWN arrows to select the following rating formats and press the RIGHT arrow button to activate each rating menu:

- Movie Ratings: Sets ratings based on MPAA ratings system.
- TV Ratings: Sets ratings based on the age of viewer and content of programming.
- Canadian Ratings (Eng): Sets age ratings for Canadian broadcasting (Eng).
- Canadian Ratings (Frn): Sets age ratings for Canadian broadcasting (Frn).

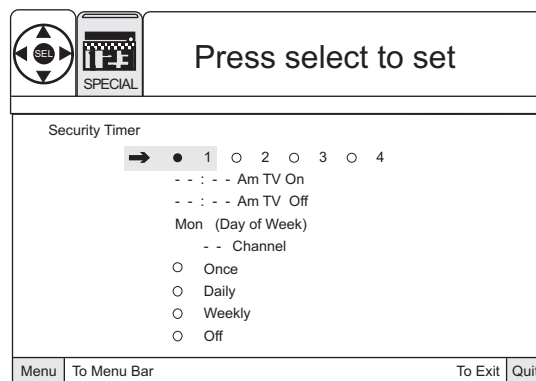
For each rating menu, use the UP/DOWN arrow buttons to choose the level of rating you wish to block. Use the SELECT button to lock or unlock the rating selection. Press QUIT to save and exit.

Notes

- Select the input source first in order to use Video lock; press the source button repeatedly on the remote until you select Input 1, Input 2, Input 3, Input 4, or Input 5. The same applies to unlocking the Video Lock.
- If Ant 1 and Ant 2 are set to the same signal source mode if a channel is locked, it is locked on both Ant 1 and Ant 2 inputs.
- Be sure the TV's internal clock is set before using any Parental Control options.
- Text automatically appears on the screen to indicate if Parental Control (Child Lock) is activate.

SECURITY TIMER

Use the Security Timer to program your TV to turn on, tune to the preset channel, and then turn off automatically at the times specified.



Press MENU and the RIGHT/LEFT arrow button to access the Special Menu. Use the UP/DOWN arrow to choose Security Timer. Press the RIGHT arrow button to go to the Security Timer option. You may set up to four ON/OFF times for your TV. Use the RIGHT arrow button to go to the TV On time option. Press RIGHT arrow to Set On time. Set time using the LEFT/RIGHT and UP/DOWN arrow buttons (the same way you set the TV's clock). Press the LEFT arrow button repeatedly until the cursor appears to the left of the current line item. Use the DOWN arrow button to choose Day, press the RIGHT arrow. Use the UP/DOWN arrow to choose which day of the week (if necessary). Press the LEFT arrow button repeatedly until the cursor appears to the left of the current line item. Use the DOWN arrow to choose Channel.

Set the channel for the TV to tune to by entering the channel number using the number keypad. Press the LEFT arrow button repeatedly until the cursor appears to the left of the current line item. Use the UP/DOWN arrow buttons to choose Once, Daily, Weekly or Off. Press SELECT to confirm your selection. Repeat steps 3-8 for three more "events" or press QUIT to save and exit.

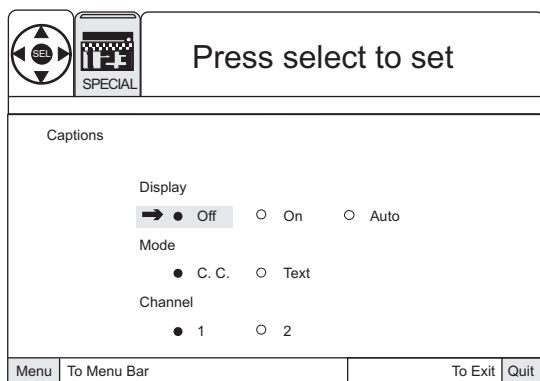
Notes

- Security Timer is designed to program the TV to turn on and off automatically. If the On Timer turned the TV on and you change channels, the Off timer is deactivated — then if no remote key is pressed, the TV turns off automatically after three hours.
- For safety reasons, it is not recommended to use the Security Timer feature to turn your TV on and off while no one is at home.

USER MENUS

CAPTIONS

Press MENU and the RIGHT/LEFT arrow button to access the Special Menu. Use the UP/DOWN arrow to choose Captions. Press the RIGHT arrow button to activate Captions option. Use the LEFT/RIGHT arrow to choose Display Off, On, or Auto option.

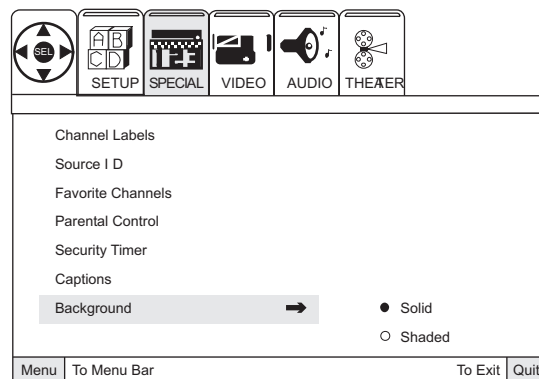


Press Select to turn captions Display On, Off, or Auto. On Caption/text option appears (if available on program). Off Caption/text option does not appear. Auto Caption/text option appears when sound is muted. Press the DOWN arrow button to choose the mode, C. C. for Closed Captions or "Text" for Text. Use the RIGHT arrow button to choose and press Select to set.

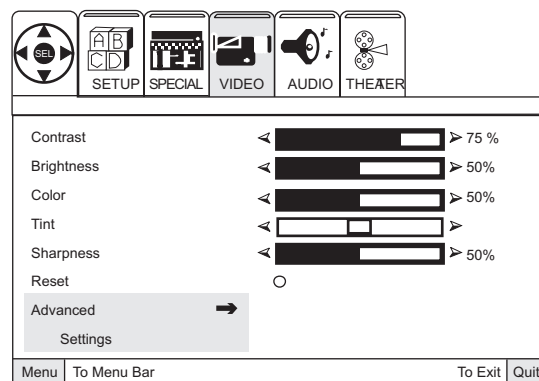
Press the DOWN arrow button to go to the Channel option. Use the RIGHT arrow to specify caption/text Channel 1 or Channel 2. (Usually this option is set to Channel 1.) Press Select to set and confirm your choice. Press QUIT to save and exit. If the POP-3 feature is displayed on the screen, the selected Closed Caption option will not appear.

BACKGROUND

Press MENU and use the RIGHT/LEFT arrow button to access the Special Menu. Use the UP/DOWN arrow to choose Background. Press the RIGHT arrow button to activate the Background option. Use the UP/DOWN arrow to choose Solid or Shaded. Solid Picture is not visible. Shaded Picture is visible through translucent menu. Press QUIT to save and exit.



VIDEO MENU



PICTURE SETTINGS

Press MENU and the RIGHT/LEFT arrow button to show the Video Menu. Use the UP/DOWN arrow to choose one of the following options. Press the RIGHT/LEFT arrow button to activate that option (For these items only, the adjustment bar will drop to the bottom of the screen, continue with normal operation.):

- Contrast: Changes the amount of difference between black levels and white levels in your picture.
- Brightness: Increases or decreases the amount of white in your picture.
- Color: Adjust levels of all colors.
- Tint: Adjust the relative amounts of the color red and green in your picture.
- Sharpness: Raise or lower the definition of the picture. The lower the level, the softer the image will appear.
- Reset: To return setting to original levels.

USER MENUS

RESET

Use the UP/DOWN arrow to choose Reset (Reset restores the levels to their original settings). Press SELECT to confirm your choice.

ADVANCED SETTINGS

Use the UP/DOWN arrow to choose Advanced Settings. Press the RIGHT arrow button to activate the Advanced Settings menu. Use the UP/DOWN arrow to choose from the following options. Press SELECT to confirm your choice:

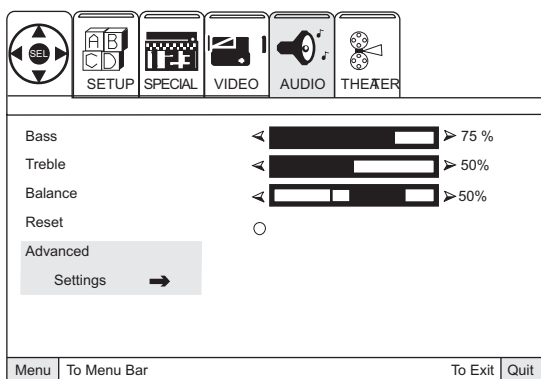
- Light Sentry: Automatically monitors and adjusts contrast depending on room lighting to produce a more natural picture. Also adjusts Auto Flesh Tone and Video Filter depending on signal.
- Auto Flesh: Automatically monitors and adjusts the color to maintain constant color levels even after a program or channel changes.
- Weak Signal: Automatically reduces conspicuous noise in the picture without degrading picture quality.
- Color Temperature: Set this to Warm for hotter colors such as red, set to Cool for less intense colors with more blue, or Medium for normal color appearance.

Press QUIT to save and exit.

Notes

- It may be necessary to adjust TINT for optimum picture quality, when viewing component video sources (Y-PBPR) connected to Inputs 3/4.
- When viewing component video sources (Y-PBPR) connected to Inputs 3/4, if the TINT and COLOR in the picture appear to be abnormal, check to be sure that the correct Component Color Type is selected for the Picture Formats option on the Setup menu.

AUDIO MENU



PICTURE SETTINGS

Press MENU and use the RIGHT/LEFT arrow button to access the Audio Menu. Use the UP/DOWN arrow to choose one of the following options. Use the RIGHT/LEFT arrow buttons to adjust that option.

- Bass: Increase/decrease lower-end sounds.
- Treble: Increase/decrease higher-end sounds.
- Balance: Allows you to put the sound more to the left or right channel.

RESET

Use the UP/DOWN arrow to choose Reset (Reset restores the levels to their original settings). Press SELECT to confirm your choice.

ADVANCED SETTINGS

Use the UP/DOWN arrow to choose Reset (Reset restores the levels to their original settings). Press SELECT to confirm your choice. Use the UP/DOWN arrow to choose Advanced Settings. Press the RIGHT arrow button to activate the Advanced Settings menu. Use the UP/DOWN arrow to choose from the following options.

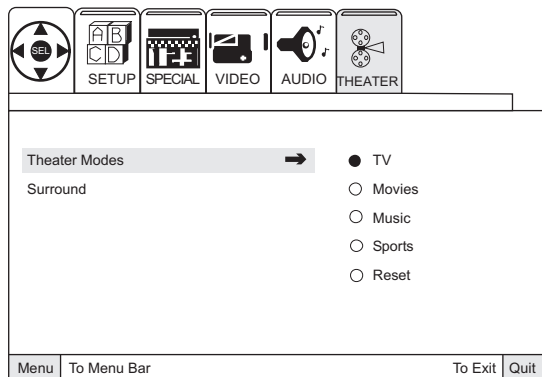
Press SELECT to confirm your choice:

- Stereo: Activate stereo sound.
- Mono: Activate mono sound.
- Second Audio Programming: Activates separate audio channel available with some programming.
- Internal Speakers: This function is useful when first setting up external speakers, or if you prefer to use only speakers from a separate stereo system.
- Auto Noise Cancel: Use to eliminate the noise between stations.
- Loudness: This function will improve the quality of both low and high frequency sounds when listening at low volume levels.
- SoundRite: This function will automatically adjust volume so each channel has the same average volume level. Press QUIT to save and exit.

Not all programming is broadcast in stereo sound, or has Second Audio Programming/SAP. Programming that doesn't broadcast SAP may be silent when you set your Entertainment Machine on this setting.

USER MENUS

THEATER MENU



THEATER MODES

Press MENU and then the RIGHT/LEFT arrow button to access the Theater menu. Press DOWN arrow button to access the Theater Modes or Surround. To change Theater Modes, press RIGHT arrow button to choose Theater Modes.

Use the UP/DOWN arrow buttons to choose which mode you prefer. Each is a preset setup designed to enhance your viewing experience. Use the UP/DOWN arrow to choose Reset (Reset restores the levels to their original settings). Press SELECT to confirm your choice.

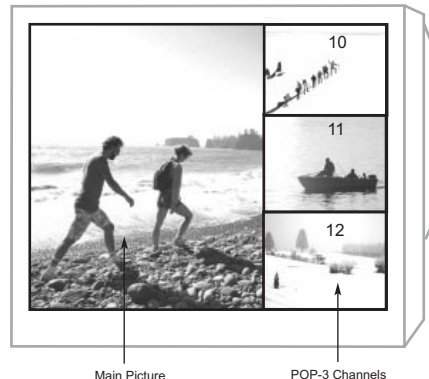
SURROUND

To activate SRS® or BBE®, choose the Surround option, then choose SRS and/or BBE. Turn them on or off depending on your preference. Press SELECT to set and confirm your choice(s). Press QUIT to save and exit.

SRS retrieves the spatial information from any stereo recording and restores the original three-dimensional sound field. As a result, the reproduced sound is much closer to that of a live performance. BBE improves the sound from all audio sources, providing a more complete high-definition reproduction of the original performance.

SRS and the symbol are trademarks of SRS labs, Inc. SRS technology is incorporated under license from SRS Labs, Inc.® Licensed by BBE Sound, Inc. under USP4638258 and 4482866. BBE and the symbol are registered trademarks of BBE Sound, Inc.

POP-3



POP-3 (Picture-On-Picture) shows multiple channels on the screen. With the TV on and Ant 1 source shown on-screen, press MULTI on the remote to turn on the POP-3 feature. POP-3 shows three additional channels on the right side of the screen. The multi-channel display also includes the channel number for reference. POP-3 will continue to display all the channels continuously, three channels at-a-time.

Press MULTI again to turn POP-3 off. POP-3 is only available on Antenna/Cable 1 source. Closed Captioning will not appear if POP-3 is active.

SPLIT SCREEN



Split Screen shows two live tunable channels on the screen at the same time. With the TV on and Ant 1 source shown on-screen, press SPLIT on the remote to turn on the Split Screen two-channel viewing feature.

Press PIP CH to switch channel tuning to the additional channel. Tune to a channel for the additional channel picture. Press PIP CH to switch channel tuning back to the original channel. Press SPLIT again to turn the feature off and return to one channel viewing. Split Screen is only available on Antenna/Cable 1 source.

CIRCUIT DESCRIPTIONS

CIRCUIT DESCRIPTIONS

POWER ON AND OFF

The power supply runs all the time when AC is applied. The use of the power supply creating Stand-By Voltage supplies eliminates the need for a Stand-By transformer. The following explanation will describe the Turning ON and OFF of the projection television.

The Microprocessor I001 generates the ON-OFF control signal from pin (53). The logic states of this pin are High = On and Low = Off. When the set is turned On, the high from pin (53) is routed to the Relay Drivers Q003 and Q004. This turns on Q003 and its collector goes low which turns off Q004 and its collector goes High. This On/Off from the Relay Drivers will perform the following:

- Turn on the Shut Down "Power Shorted" detection circuit, Q917 and Q919.
- Turn on the Relay S901 through Q914 providing AC to the Deflection Power Supply on the Power/Deflection PWB.

POWER SUPPLY SHUTDOWN

This chassis utilizes I901 as the Osc.\Driver \Switch for the sub power supply, just as the previous chassis have done. The Shutdown circuit, (cold ground side detection) removes I901 B+. I903 (the Photo Coupler) which isolates the Hot ground from the Cold ground and couples the Shutdown signal to the Hot Ground side, Q902 on the hot ground side and Q901 which latches Q902 on. When Q902 is on, it removes B+ from pin (4) of I901 (the Vin pin).

The Power Supply utilizes a Shutdown circuit that can trigger Q902 from 5 input sources. (1 of these Short Detection circuits are not operational in Stand By mode). I903 is activated by a Low being applied to pin 2, which forward biases the internal LED. The light from this internal LED is then coupled to the receiver transistor. The receiver transistor turns On and output a High from pin 3. This high is routed to the base of Q902 turning it On, which grounds out the Vin at pin (4) of I901, disabling the power supply.

All of the Power Supply Shutdown circuitry can be broken down into the following groups;

- Voltage Missing Detection
- Voltage Too High Detection

In the following explanation, the Shutdown circuits will be grouped. This will assist the Service Technician with trouble shooting the Chassis, by understanding these circuits and having the associated circuit routes, the technician can then "Divide and Conquer".

STAND-BY MODE

As indicated in the Power On/Off circuit diagram explanation, 3 of the 6 shut down inputs are not active when the set is in standby.

- Shorted SW +2.5V (IC03) on Signal PWB through Protect 1 to (D940) on Sub Power Supply PWB
- Shorted SW +3.3V (IC04) on Signal PWB through Protect 1 to (D940) on Sub Power Supply PWB
- Shorted SW +5V (IC02) on Signal PWB through Protect 1 to (D940) on Sub Power Supply PWB

These SW voltage loss sensing circuits are defeated because the Shorted SW (Switched) power supply detection circuits are turned off in stand-by to prevent faults triggering of the shutdown circuit.

Q919 supplies the high for shutdown if any of the voltage loss circuits become activated. Q919 requires emitter voltage to operated. Emitter voltage is supplied from the emitter of Q917. Q917's base is connected to the power on/off line. When the set is not on or turned off, the power on/off line goes Low. This Low pulls the cathode of D927 low, removing the base voltage of Q917 turning it OFF. This removes the emitter voltage from Q919 and this circuit can not function.

HOT SHUT DOWN SENSING CIRCUITS

(INTERNAL TO I901)

LATCHED SHUT DOWN MONITORS: (AC must be removed to recover).

1. Pin 4 is monitored for Over Voltage at pin 4 of I901.
2. I901 itself is monitored for Excessive Heat. This block is labeled T.P.O. (Thermal Protection Overload).

RECOVERING SHUT DOWN INPUT: (Driver IC will recover on its own when trouble is removed.)

3. Pin 5, besides being used as a regulation input, also monitors the low ohm resistors R910, R911, and R912. If these resistors have an excessive current condition caused by monitoring the current through the internal Switch MOS FET, the voltage will rise and pin 5 has an internal Over Voltage detection op-amp. If this voltage rises enough to trigger this op-amp, the IC will stop producing a drive signal.

COLD SHUT DOWN SENSING CIRCUITS

(AC must be removed to recover)

All of the Cold Ground side Shutdown detection circuits can be categorized as either Voltage shorted or Voltage too high.

VOLTAGE SHORTED DETECTION

- Shorted STBY +3.3V (Q025) on Signal PWB through PROTECT 2 to (D938) on Sub Power Supply PWB
- Shorted SW+2.5V (IC03) on Signal PWB through PROTECT 1 to (D940) on Sub Power Supply PWB
- Shorted SW+3.3V (IC04) on Signal PWB through PROTECT 1 to (D940) on Sub Power Supply PWB

CIRCUIT DESCRIPTIONS

- Shorted SW +5V (IC02) on Signal PWB through PROTECT 1 to (D940) on Sub Power Supply PWB

NOTE: PROTECT 1 will not go below 2.2V even if the 5V or the 3.3V lines are open.

VOLTAGE TOO HIGH DETECTION

- STBY +9V monitored by (D933, D934)
- STBY +5V monitored by (D935, D936)

If any one of these circuits activate, the power supply will STOP and create a Power Supply Shutdown Condition.

POWER SUPPLY SHUTDOWN CIRCUIT

SHUTDOWN CIRCUIT

There are a total of 6 individual Shutdown inputs. In addition, there are 3 Hot Ground side Shutdown inputs that are specifically detected by the main power driver IC I901. These sensors circuits protect I901 from excessive current or voltage.

POWER SUPPLY SHUTDOWN EXPLANATION

This chassis utilizes IP01 as the Osc.\Driver \Switch for the Deflection power supply, just as the previous chassis have done. This IC is very similar to the previous versions. The Shutdown circuit, (cold ground side detection), is used to turn off the Relay S901 via the following circuit, Connector PQD2 pin 1, Q916 the Relay Driver on the Sub Power Supply PWB and the Relay S901 also on the Sub Power Supply PWB.

The Power Supply utilizes a Shutdown circuit that produces a High from 12 different sources. When any of these inputs cause a high on the Connector PQD2 pin 1, the relay disengages, disabling the deflection power supply.

All of the Power Supply Shutdown circuitry can be broken down into the following groups;

- Voltage Missing Detection
- Excessive Current Detection
- Voltage Too High Detection

In the following explanation, the Shutdown circuits will be grouped. This will assist the Service Technician with trouble shooting the Chassis, by understanding these circuits and having the associated circuit routes, the technician can then "Divide and Conquer".

SHUTDOWN DETECTION CIRCUITS

EXCESSIVE CURRENT DETECTION

One very common circuit used in many television products is the B+ Excessive Current Sensing circuit. In this circuit is a low ohm resistor in series with the particular power supply, (labeled B+ in the drawing). The value of this resistor is determined by the maximum current allowable within a particular power supply. In the case of Figure 1, the value is shown as a 0.47

ohm, however it could be any low ohm value. When the current demand increases, the voltage drop across the resistor increases. If the voltage drop is sufficient to reduce the voltage on the base of the transistor, the transistor will conduct, producing a Shutdown signal that is directed to the appropriate circuit.

VOLTAGE LOSS OR EXCESSIVE LOAD DETECTION

The second most common circuit used is the Voltage Loss Detection circuit. This is a very simple circuit that detects a loss of a particular power supply and supplies a Pull-Down path for the base of a PNP transistor.

This circuit consist of a diode connected by its cathode to a positive B+ power supply. Under normal conditions, the diode is reversed biases, which keeps the base of Q1 pulled up, forcing it OFF. However, if there is a short or excessive load on the B+ line, the diode in effect will have a LOW on its cathode, turning it ON. This will allow a current path for the base bias of Q1, which will turn it ON and generates a Shutdown Signal.

B+ VOLTAGE TOO HIGH DETECTION

In this circuit, a Zener diode is connected to a voltage divider or in some cases, directly to a B+ power supply. If the B+ voltage increases, the voltage at the voltage divider or the cathode of the zener diode will rise. If it gets to a predetermined level, the zener will fire. This action creates a Shutdown Signal.

NEGATIVE VOLTAGE LOSS DETECTION

The purpose of the Negative Voltage Loss detection circuit is to compare the negative voltage with its counter part positive voltage. If at any time, the negative voltage drops or disappears, the circuit will produce a Shutdown signal.

There are two resistors of equal value. One to the positive voltage, (+12V) and one to the negative voltage, (-12V). At their tie point, (neutral point), the voltage is effectually zero (0) volts. If the negative voltage is lost due to an excessive load or defective negative voltage regulator, the neutral point will go positive. This in turn will cause the zener diode to fire, creating a Shutdown Signal.

DEFLECTION SHUT DOWN CIRCUITS

There are a total of 12 Cold Ground Side individual Shut down inputs. There are also 3 Hot Ground Side Shut down inputs that are specifically detected by the main power driver IC, IP01 that protect it from excessive current or over voltage. All of the Shut down detection circuits can be categorized by the four previously described circuits.

CIRCUIT DESCRIPTIONS

HOT GROUND SIDE SHUT DOWN SENSING CIRCUITS

(INTERNAL TO IP01)

LATCHED SHUT DOWN MONITORS

(AC must be removed to recover)

1. Pin 4 is monitored for Over Voltage internal to IP01.
2. IP01 itself is monitored for Excessive Heat. This block is labeled T.P.O. (Thermal Protection Overload).

RECOVERING SHUT DOWN INPUT

(Driver IC will recover on it's own when trouble is removed)

3. Pin 5 besides being used as a regulation input, it also monitors low ohm resistors RP10, RP11, RP12, and RP16, (All are 0.22 ohm resistors). If these resistors have an excessive current condition caused by monitoring the current through the internal Switch MOS FET, the voltage will rise. Pin 5 has an internal Over Voltage detection op-amp. If this voltage rises enough to trigger this op-amp, the IC will stop producing a drive signal.

COLD GROUND SIDE SHUT DOWN CIRCUITS

These Circuits are broken down into the appropriate categories as described earlier.

VOLTAGE LOSS DETECTION

1. Shorted 220V (DP24 and DP25) Inverted by QP03 then through DP28
2. Shorted SW+35V (DP26) Inverted by QP03 then through DP28
3. Shorted 28V (DP27) Inverted by QP03 then through DP28
4. Shorted Deflection Transformer or Miss-operation (D707 and Q705) then through D705

NEGATIVE VOLTAGE LOSS DETECTION

5. -28V Loss Detection (RP21, RP20, DP35, DP21 and DP22)

EXCESSIVE CURRENT DETECTION

6. 115V Deflection Power Supply (RP24, QP02, DP18, DP19 and DP20)
7. 28V Vertical IC I601 Power Supply (R629, Q609, D608, and DP31)

VOLTAGE TOO HIGH DETECTION

8. Excessive High Voltage Detection (DH17, DH13 and DH15). Sensed from the 50P Voltage generated from pin (5) of the Flyback Transformer TH01. Also, (DH14) sends a high command to the Horizontal Driver IC IH01 pin 7, to defeat Horizontal Drive Output if this voltage goes too high.
9. Side Pincushion failure generating a High. (D702, and D703).

10. Deflection B+ Too High. (DP17, RP26 and RP27).

11. SW +9V Voltage Too High Detection. (DP29 and DP30)

12. ABL Voltage Too High Detection. (DH15)

If any one of these circuits are activated, the power supply will STOP, and create a Power Supply Shut down Condition.

SHUT DOWN CIRCUIT DESCRIPTIONS

Shut down occurs when pin (1) of Connector PQD2 called PROTECT goes High. This High is routed to the Sub Power Supply PWB and is impressed on the base of the Relay Driver Transistor Q916 turning it On. When Q916 turns On, it removes the Power On High and the Relay S901 will disengage and removes the AC source from the Deflection Power Supply.

Please use the Commonly Used Shut down Detection Circuits for the description of how the circuit works.

VOLTAGE LOSS DETECTION

1. Shorted 220V (DP24 and DP25) Inverted by QP03 then through DP28. The cathode of DP24 is connected directly to the 220V line. If it shorts, this circuit is activated and pulls the base of QP03 low. This output High is routed through DP28 to pin (1) of Connector PQD2 called PROTECT and Shut Down occurs as described above.
2. Shorted SW+35V (DP27) Inverted by QP03 then through DP28. The cathode of DP27 is connected directly to the SW+35V line. If it shorts, this circuit is activated and pulls the base of QP03 low. This output High is routed through DP28 to pin (1) of Connector PQD2 called PROTECT and Shut Down occurs as described above.
3. Shorted 28V (DP27) Inverted by QP03 then through DP2. The cathode of DP27 is connected directly to the 28V line. If it shorts, this circuit is activated and pulls the base of QP03 low. This output High is routed through DP28 to pin (1) of Connector PQD2 called PROTECT and Shut Down occurs as described above.
4. Shorted Deflection Transformer or (D707 and Q705) or D705. The Deflection circuit generates the actual Drive signal used in the High Voltage section. If a problem occurs in this circuit, the CRTs could be damaged or burnt. D707 is connected to R728 which normally passes the same pulse as used for generation of the H. Blanking signal. This pulse is generated off the Deflection Transformer T752. The pulse is rectified by D707. This rectified voltage is normally sent to the base of Q705 keeping it On and its collector Low. If the Deflection circuit fails to produce the pulses for rectification, the base voltage of Q705 disappears and the tran-

CIRCUIT DESCRIPTIONS

istor turns Off, generating a High on its collector. This output High is routed through D705 to pin (1) of Connector PQD2 called PROTECT and Shut Down occurs as described above.

NEGATIVE VOLTAGE LOSS DETECTION

Please use the Commonly Used Shutdown Detection Circuits for the description of how the circuit works.

5. -28V Loss Detection (RP21, RP20, DP35, DP21 and DP22). RP21 (15K ohm) is connected to the negative -28V line and RP20 (15K ohm) and DP35 (LED) is connected to the positive +28V line. The Cathode of DP21 monitors the neutral point where these components are connected. If the negative voltage disappears, the zener DP21 fires. This high is routed through DP22 to pin (1) of Connector PQD2 called PROTECT and Shut Down occurs as described above.

EXCESSIVE CURRENT DETECTION

Please use the Commonly Used Shutdown Detection Circuits for the description of how the circuit works.

6. 115V Deflection Power Supply (RP24, QP02, DP18, DP19 and DP20), If an excessive current condition of the Deflection B+ is detected by RP24 a 0.47 ohm resistor, the base of QP02 would drop. This would turn on QP02 and the high produced at the collector would fire zener DP18. This High would be routed through DP19 through DP20 to pin (1) of Connector PQD2 called PROTECT and Shut Down occurs as described above.
7. Vertical 28V for IC I601 Power Supply (R629, Q609, D608, and DP31). If an excessive current condition of the Vertical B+ is detected by R629 a 0.68 ohm resistor, the base of Q609 would drop. This would turn on Q609 and the high produced at the collector would be routed through D608 through DP31 to pin (1) of Connector PQD2 called PROTECT and Shut Down occurs as described above.

VOLTAGE TOO HIGH DETECTION

Please use the Commonly Used Shutdown Detection Circuits for the description of how the circuit works.

8. Excessive High Voltage Detection (DH17, RH13, and DH15) is sensed from the Heater Voltage generated from pin (5) of the Flyback Transformer TH01. Also, (DH14) sends a high command to the Horizontal Driver IC IH02 to defeat Horizontal Drive Output if this voltage goes too high.

The Flyback Transformer TH01 generates a pulse called Heater. (Note: This does not go to the CRTs as heater voltage, it is used for Excessive High Voltage Detection). If this voltage goes too high, indicating an excessive High Voltage condition, the high will be impressed on the cathode of DH15. This high is routed to pin (1) of Connector PQD2

called PROTECT and Shut Down occurs as described above.

9. Side Pincushion failure generating a High. (D702, and D703). The Side Pin Cushion op-amp circuit is comprised of I701. If a problem occurs in this circuit it creates a High from pin 7 of I701. This high is impressed on the cathode of D702, and the zener will fire. This High will be routed through D703 to pin (1) of Connector PQD2 called PROTECT and Shut Down will occur as described above.

10. Deflection B+ Too High. DP17, RP26 and RP27

RP26 and RP27 form a voltage divider. The top side of RP27 is monitored by DP17. If the Deflection 115V voltage goes too high, the zener DP17 will fire. This high is routed through DP19 to pin (1) of Connector PQD2 called PROTECT and Shut Down occurs as described above.

11. SW +9V Power Supply Too High Detection. (DP29 and DP30). The SW +9V voltage is monitored by DP29. If this voltage goes too high, the zener DP29 will fire. This high is routed through DP30 to pin (1) of Connector PQD2 called PROTECT and Shut Down occurs as described above.

12. ABL Voltage Too High Detection. (DP15)

The ABL voltage is generated by the voltage drop across the ABL pull up resistors, (RH27 and RH28). According to the Flyback current demands. (See ABL circuit diagram for details). The ABL voltage is clamped at a maximum of 11V by (DH16).

If the ABL voltage goes too high, the zener DP15 will fire. This high is routed through to pin (1) of Connector PQD2 called PROTECT and Shut Down occurs as described above.

SHUT OFF DURING STAND-BY

During Stand-By, some of the secondary voltages produced are turned off, except the STBY voltages after regulation. This could cause a potential problem with the Short Detection circuits for shutdown. To avoid accidental shut down, Q917 also controls the activity of Q919. During Stand-By, the output from the Microprocessor On/Off pin (53) is Low. This Low is inverted by Q003 and inverted again by Q004 and this Low is routed to the base of Q917 turning it Off. This turns off Q917 because its base is pulled Low through D927. This action turns off Q917. When Q917 is off, it doesn't supply emitter voltage to the Emitter of Q919. The base of Q919 is connected to 3 Low Detection inputs from [PROTECT 1], (See the Sub Power Supply Shut Down Circuit explanation for further details). PROTECT 1 monitors IC02, 3 & 4 on the Signal PWB. IC02 produces 5.5V, IC03 produces 3.3V, and IC02 produces 2.2V.

NOTE: PROTECT 1 will never go below 2.2 V, unless the 2.2V line is shorted.

CIRCUIT DESCRIPTIONS

NOTE: If the 5.5V or the 3.3V regulators OPEN, the set will not go into shut down, they must have a short to produce a shut down input on PROTECT 1.

The set will shut down after the Screen go excessively bright, but this is from the 115V over current sensor, not PROTECT 1. When the power supply is in Stand By, the Short Detection circuit could activate. By turning off Q919, no accidental shut down operation can occur.

SUB POWER SUPPLY VISUAL LED

The Chassis has 1 Green LED on the Sub Power Supply PWB. This chassis utilizes 1 Green LED in the power supply cold side. The power supply operates in two different modes, Standby and Projection On mode. The LED is lit in the Standby or Power On mode with the AC applied and the TV ON or OFF;

- SRS Audio Front 29V Regulator +29V indicated by D912 Color GREEN

LED USAGE

The Visual LED is very useful in Trouble Shooting. Without removing the back cover, some diagnostics can be made. By observing the operation of the Green LED, the technician can determine if the Sub Power Supply is running or not. The following will examine how the LED is illuminated.

POWER ON ENERGIZE:

When the Microprocessor outputs a High from pin 53 when power is turned ON, the high is inverted by Q003 to a LOW. This low is inverted by Q004 to a HIGH and routed through the PQS1 connector pin 2. This high is routed through R954, R951, D926 to the base of Q914. This transistor turns ON and it's collector goes LOW.

This low is the Ground return for the Relay S901. The B+ for the primary of the relay is the SBY +5V generated by the switching transformer pin 15, rectified by D920, filtered by C935, L915, and C936.

When the relay S901 turns on, the contacts close and AC is routed to the Deflection circuit power supply and the Deflection Power Supply is Energized.

DEFLECTION HORIZONTAL DRIVE ACTIVATION

(IC01 Rainforest IC)

When the set has AC applied, one of the switch pulses generated on the Sub Power PWB is the +11V pulse from pin 10 of the Switching Transformer I901. This +11V pulse is rectified by D919 and filtered by C929. This +11V DC voltage is then routed to the +9V regulator I906 pin 1. When the set is turned ON, the Horizontal Drive Power supply I906 is activated. This happens when pin 2 of I906 goes high with the Power On/Off control line from PQS1 pin 2. The +9V is output via pin 3 to the PQD2 connector pin 5. From here the +9V is routed through the Deflection PWB to the Signal PWB via PSD3

connector pin 11, through the coil LC03 to pin 19 of IC01 the Rainforest IC. When this voltage is applied to pin 19, the horizontal circuit inside the Rainforest IC is activated and a horizontal drive signal is output from pin 26. This H. Drive signal is routed through the PSD2 connector pin 5 to the base of the horizontal drive transistor Q709 on the Deflection PWB. The collector of Q709 produces a drive signal routed through the drive transformer T702 and output from pin 4 to the base of the Deflection Horizontal Output Transistor Q777 to begin driving the deflection circuit which in turn, activates the High Voltage circuit.

The sub power supply in the chassis works very similar to the previous models, with some very significant exceptions. The use of the power supply creating the SBY+11V supply eliminates the need for a Stand-By transformer. The following explanation will describe the Sub Power Supply Shut Down Circuit.

VOLTAGE LOSS OR EXCESSIVE LOAD DETECTION

The second most common circuit used is the Voltage Loss Detection circuit. This is a very simple circuit that detects a loss of a particular power supply and supplies a Pull-Down path for the base of a PNP transistor.

This circuit consists of a diode connected by its cathode to a positive B+ power supply. Under normal conditions, the diode is reverse biased, which keeps the base of Q1 pulled up, forcing it OFF. However, if there is a short or excessive load on the B+ line, the diode in effect will have a LOW on its cathode, turning it ON. This will allow a current path for the base bias of Q1, which will turn it ON and generate a Shutdown Signal.

B+ VOLTAGE TOO HIGH

In this circuit, a Zener diode is connected to a voltage divider or, in some cases, directly to a B+ power supply. If the B+ voltage increases, the voltage at the voltage divider or the cathode of the zener diode will rise. If it gets to a predetermined level, the zener will fire. This action creates a Shutdown Signal.

SHUT DOWN CIRCUIT

Shut down occurs when the shutdown Photo Coupler I903 is activated by pulling pin 2 low.

When I903 is activated by pulling pin 2 low it gives a ground path for the emitter of the LED inside I903. The light produced by turning on this LED turns on the internal photo receiver and generates a high out of pin (3). This high is routed to the base of Q902, turning it on. This grounds pin (4) of I901, removing Vin, and the power supply stops working.

The reason for the photo sensor I903 is to isolate hot and cold ground.

CIRCUIT DESCRIPTIONS

B+ GENERATION FOR SUB POWER SUPPLY DRIVER

Vcc for the Driver IC is first generated by the AC input. This voltage is called Start Up Voltage. I901 requires 16V DC to operate normally. It will begin operation at 6.8V DC on pin (4) of I901.

When AC is applied, AC is routed through the main fuse F901 (a 6 Amp fuse), then through Line filters L901, and L902 to prevent any internal high frequency radiation back into the AC power line. After passing the filters it arrives at the main full wave bridge rectifier D901 where it is converted to 150V DC voltage to be supplied to the power supply switching transformer T901 pin (1).

One leg of the AC is routed to a half wave rectifier D906 where it is rectified, routed through R903 and R904

(22K ohm resistors), filtered by C910, clamped by a 30V Zener D902 and made available to pin (4) of I901 as start up voltage. When this voltage reaches 6.8Vdc, the internal Regulator of I901 is turned On and begins the operation of I901.

When the power supply begins to operate by turning on and off the internal Switch MOS FET, the 150V DC routed through T901, in on pin 1 (Drain) and out on pin 2 which is the Source. The Source of the internal Switch MOS FET is routed out of pin (2) through three low ohm resistors to hot ground. When the internal Switch MOS FET turns on, it causes the transformer to saturate, building up the magnet field. When the internal Switch MOS FET turns off, the magnet field collapses and the EMF is coupled over to the secondary windings, as well as the drive windings. The drive windings at pin (5) produce a run voltage pulse which is rectified by D903, filtered by C909, then routed through R906, filtered again by C908, clamped by D902, and now becomes run voltage (16V) for I901.

DEFLECTION POWER SUPPLY VISUAL LEDES

The Chassis has 4 Green and 1 Red LEDs on the Deflection Power Supply PWB. This chassis utilizes 4 Green LEDs in the power supply cold side and a Red LED in the HOT side.

POWER ON MODE

When the Power is turned ON, the LEDs light;

- 1) DP06 Indicating Vcc applied to the Power Supply Driver IC IP01 pin 4 (Colored RED)
- 2) DP23 Indicating 115V Deflection B+ is available (Colored GREEN)
- 3) DP37 Indicating SW +5V B+ is available (Colored GREEN)
- 4) DP11 Indicating SW +9V B+ is available (Colored GREEN)
- 5) DP35 Indicating 28V B+ is available (Colored GREEN)

LED USAGE

The Visual LEDs are useful in Trouble Shooting. Without removing the back cover, some diagnostics can be made. By observing the operation of the Red and Green LEDs, the technician can determine if the Deflection Power Supply is running. By monitoring these LEDs at turn on, one can determine if a line is loaded. If an LED tries to light then goes off, or only lights dimly, a loaded condition should be considered. Remember, this power supply doesn't operate when the set is in Standby. The following will examine each LED and how they are lit.

DP06

Indicating Vcc applied to the Power Supply Driver IC IP01 pin 4 (Colored RED). If B+ (Vcc) is present on the Deflection Power Supply Driver IC? LED will be ON.

DP23

Indicating 115V Deflection B+ is available (Colored GREEN). This LED is connected directly to the 115 V deflection B+ line. If it's lit, 115V is available.

DP37

Indicating SW +5V B+ is available (Colored GREEN). This LED is connected directly to the SW +5V B+ line. If it's lit, +5V is available.

DP11

Indicating SW +9V B+ is available (Colored GREEN). This LED is connected directly to the SW +9V B+ line. If it's lit, +9V is available.

DP35

Indicating 28V B+ is available (Colored GREEN). This LED is connected directly to the +28V B+ line. If it's lit, +28V is available.

DEFLECTION POWER DRIVER B+ GENERATION

START UP VOLTAGE GENERATION

Vcc for the Driver IC is first generated by the AC input. This voltage is called Start Up Voltage. IP01 requires 21V DC to operate normally. It will begin to regulate at 14V DC on pin (4) of IP01.

When AC is applied by the relay on the Sub Power Supply R901, AC is routed through the connector PQD1. Then it arrives at the main full wave bridge rectifier DP01 where it is converted to DC voltage. One leg of the AC is routed through RP02 and RP03 (3.9K ohm resistors), filtered by CP05, and made available to pin (4) of IP01 as start up voltage. The Red LED DP03 is illuminated by this power supply. When this voltage reaches 6.8Vdc, the internal Regulator of IP01 is turned On.

RUN VOLTAGE GENERATION

After the transformer TP91 is started, a pulse is output from pin 8. This pulse is rectified by DP02, filtered by

CIRCUIT DESCRIPTIONS

CP05 and takes over as Run Voltage (16.3V) at pin 4 of IP01.

REGULATION

Figure 2 is a simplified diagram of the main Power Supply used in some Projection Television chassis.

The primary control element of the power supply is IP01 (the Switching Regulator IC), in conjunction with transformer TP91. These two components, along with the supporting circuitry, comprise a closed loop regulation system.

Unlike previous Pulse Width Modulated (PWM) Switch Mode power supplies, the regulation system in this chassis utilizes Frequency Control Modulation with an operational frequency of 60KHZ to 85KHZ, corresponding to full load and no load conditions, respectively. Primary regulation is provided by IP03, IP02 and into IP01, regulating the switching frequency at pin (3) of I901 via pin 1.

Two voltages are developed that are needed to sustain run and maintain regulation:

1. Run Voltage generated from pin (8 and 9) of TP91 rectified by DP02 and supplies run voltage to IP01 pin (4).
2. 115V Deflection Voltage generated from pin (11) of TP91, rectified by DP15 and used for regulation and powering the Deflection and regulation circuitry.

DEFLECTION GENERAL INFORMATION

The deflection circuit differs from conventional projection products. It utilizes, two horizontal output circuits. One for Deflection and one for High Voltage. There are many terms around the Horizontal circuit that are not shown on the Diagram. Some of these terms are:

CUT OFF

Cut off collapses the Vertical circuit during I²C Bus alignments, during CRT Set Up.

ABL

ABL voltage is generated by monitoring the current through the Flyback transformer. This voltage will fluctuate down when the scene is bright and up when the scene is dark. The ABL voltage will manipulate the screen brightness and contrast to prevent blooming under these conditions.

H BLK

Horizontal and Vertical Blanking is developed within the Deflection circuit. The Horizontal Blanking pulse operates around 13V P/P and is produced by taking a sample pulse from the Deflection transformer T752.

V BLK

The Vertical Blanking pulse is generated from the Vertical output IC, I601 pin (11). This pulse normally operates at 21V P/P.

IR

The Infrared Pulses coming from the remote control are routed through the Deflection PWB to the Digital Convergence Unit. During DCAM (Digital Convergence Adjustment Mode), the Remote Control provides manipulation pulses for the DCU.

DIG RGB/ BUSY

This indicates Digital RGB and BUSY.

- Digital RGB represents the On Screen Characters produced by the DCU for generating the Digital Convergence adjustment grid and text produced during certain conditions such as HD Focus, Sensor Initialization, Data Storage, etc...
- Busy notifies the DAC1 (I006 pin 1) which in turn notifies the Microprocessor I001 that the DCU has entered the DCAM. During this time, the Microprocessor ignores the remote control commands.

D SIZE

Digital Size is a control signal for raster enlargement when HD FOCUS is operated. Raster enlargement is required for the HD FOCUS PATTERN to hit the photo sensors.

This signal is output from DCU and routed to the base of Q710 for enlarging horizontal size through the Pin Cushion circuit and through Q603 to the Vertical Output IC I601 pin (4) to enlarge the vertical size.

In some cases, this control signal is called "A.SIZE". It's the same function between DIG.SIZE and A.SIZE.

TO CONVERGENCE YOKES

The DCU provides compensation signal for deflection abnormalities to the convergence output IC. The Convergence output IC in turn, amplifies the signals and routes them to the convergence yokes.

+B 115V1

The Deflection transformer receives the 115V V1 DC source.

+B 115V2

The High Voltage Transformer TH01 (Flyback) receives the 115V V2 DC source.

HV PARABOLA

See DF Out.

SCREEN 700V

700V Supplied to the screen grids on the CRTs.

FOCUS 12KV

Focus voltage supplied to the CRTs.

CIRCUIT DESCRIPTIONS

30Kv HV

30,000 volts DC supplied to the CRTs anodes.

TO DEFLECTION YOKES

Horizontal and Vertical deflection wave forms driving the deflection yokes.

MAGIC SWITCH

Output from the DAC1 (I006 pin 7) when the customer selects HD FOCUS from the customer's menu. This energizes HD FOCUS, (Magic Focus).

SERVICE ONLY SWITCH

Enters the Digital Convergence Adjustment Mode, (DCAM).

HORIZONTAL DRIVE CIRCUIT DESCRIPTION:

When B+ arrives at the Rainforest IC IC01 pin (19), horizontal drive is output from pin (26). The drive signal is routed through the connector PSD2 pin 5 to the Horizontal Driver Transistor Q751. This transistor switches the ground return for pin (8) of the Driver transformer (T751). 28 volts is supplied to pin (5) and this switching allows EMF to develop. As this signal collapses, it creates a pulse on the output pin of (T751) at pin (4) to the base of the Deflection Horizontal output transistor Q777.

Two transistors monitor the SW +9V line, Q707 and Q708. When the set is turned off, the H. Drive signal from IC01 could stop too soon. If this were to happen, the Horizontal output transistor Q777 would be damaged. To prevent this, if the SW +9V line drops, Q707 senses this because its base voltage drops. The base of Q708 rises and turns on, grounding the output from the H. Drive Transistor Q709.

Q709 transistor switches the primary windings of the Deflection Transformer T752.

T702 TRANSFORMER PRODUCES THE FOLLOWING OUTPUT PULSES;

- Deflection Pulse from pin (7): This pulse is used by:
 1. X-Ray Protect through D707: This signal is monitored by the X-Ray Protect circuit to place the power supply into shut down if the Deflection circuit doesn't operate.
 2. The Dynamic Focus OUT Circuit PWB through PDK4 connector pin 5: A Dynamic Focus waveform, (Horz. Parabola) is created. This is a parabolic waveform that is superimposed upon the static focus voltage to compensate for beam shape abnormalities which occur on the outside edges of the screen because the beam has to travel further to those locations.
 3. 1100V Generation circuit through D711, D712 and the connector PDF1 pin 1.

This is the Dynamic Focus output voltage.

- +28V, -26V and RETRACE PULSE +28V and -28V: The +28V and the -28V are routed to the Deflection transformer T752. They enter the transformer as a pure DC voltage then a 7.5V P/P horizontal pulse is added to the DC voltage and leave as +28P and M28P. From here these voltages are routed to the Convergence output section and they are rectified. They become +33V and -33V respectively. This process prevents the need for another power supply. (Note: the M stands for Minus voltage.)

H. BLK GENERATED FROM PIN 7:

The Horizontal Pulse is also routed to the Horizontal Blanking generation transistor Q706. This transistor generates the 13V P/P called H Blk. This signal goes to the following circuits:

- To pin the PSD2 connector pin 7 to pin (24) of IC01 as FBP In. Here this signal is used as a comparison signal. It is compared to the reference signal coming in at pin (15) Horizontal Sync. If there are any differences between these two signals, the output Drive signal from pin (26) is corrected.

NOTE: When a 1080i signal is input through component inputs, the Rainforest IC detects this as well and outputs the Vertical Squeeze (V. Squ) signal from pin (36). The Reference signal for Horizontal Sync now becomes the Y input from component, pin (8).

- To the Convergence circuit for correction waveform generation.
- Sweep Loss Circuit (QN01) to shut off the CRTs if Horizontal deflection is lost.
- Through the connector PSD2 pin (7): The H Blk signal is routed from here to the Signal PWB to be used by different circuits.

The Microprocessor uses this signal for OSD positioning and for Station Detection during Auto programming within the coincidence detector.

The PinP unit uses this signal for switching purposes. Like the read/write clock, positioning, etc...

- The Horizontal Blanking signal H Blk from Q706 is also sent to the High Voltage Driver IC IH01 pin (3). This IC uses this signal as its reference signal to produce the High Voltage Drive waveform output from pin (1). This output is routed to the driver transistors, QH02. Then to the High Voltage Horizontal Output Transistor QH01. This transistor switches the primary of the Flyback transformer TH01. Deflection B+ 115V2 is sent through pin (9) and output pin (10) to the collector of the Horizontal Output Transistor QH01.

CIRCUIT DESCRIPTIONS

A sample of the High Voltage is output from the Flyback transformer TH01 pin (12). This voltage is sent to pin (9) of the High Voltage Driver IC IH01. This voltage is compared to the reference voltage available at pin (12). If there is a difference between the two voltages, an error voltage is generated and output from pin (10) and input again at pin (11) where it manipulates the PWM (Pulse Width Modulation) signal producing the Horizontal Drive signal output from pin (1).

The error signal from pin (10) is also sent to the Side Pin Cushion circuit through (R752). This signal manipulates the amount of pin cushion correction dependent upon the amount of High Voltage error voltage detected by the Side Pin Cushion op-amp (I701) at pin (3).

It's important to notice that the High Voltage circuit can not function without the Horizontal Deflection circuit providing a drive signal.

GENERAL INFORMATION:

The deflection circuit differs from conventional products. It utilizes two horizontal output circuits. One for Deflection and one for High Voltage. There are many terms around the Horizontal circuit that are not shown on the Diagram. Some of these terms are explained first:

The key component in the Sweep Loss Detection circuit is QN02. This transistor is normally biased off. When the base becomes more negative, it will be turned on, causing the SW +11V to be applied to two different circuits, the Spot circuit and the High Voltage Drive circuit.

SPOT CIRCUIT

When QN02 is turned on, the SW +11V will be applied to the anode of DN11, forward biasing it. This voltage will then pass through DN11. It will then be clamped by DN12, and arrive at pin 3 of PSD2. It will then be directed to the Signal PWB where it will activate the Video Mute circuitry Q023 - Q021. This is done to prevent CRT burns.

Another input to this circuit is pin 4 of PSD2 called "CUT OFF". This will activate when accessing certain adjustment parameters in the service mode; i.e. turning off vertical drive for making CRT drive or cut-off adjustments. When Vertical Drive is defeated, the Vertical Sweep loss circuit would activate. Cut Off is routed to QN06 to "inhibit" the Spot line from activating and shutting off the CRTs.

HIGH VOLTAGE DRIVE CIRCUIT

When QN02 is turned on, the SW +11V will also be routed through RN15 and DN09 and applied to the High Voltage Drive IC IH01 at pin 14. When this occurs, the IC will stop generating the drive signal that is used to produce High Voltage via QH02, the High Voltage Driver. Again, this is done to prevent CRT burn, especially dur-

ing sweep loss.

CONCERNING QN02

There are several factors that can affect the operation of QN02: namely loss of vertical or horizontal blanking and spot killer or spot protect from a shutdown in the deflection power supply.

Loss of Vertical Blanking (V Blk)

The Vertical pulse at the base of QN05 switches QN05 on and off at the vertical rate. This discharges CN03 sufficiently to prevent the base of QN04 from going high to turn it on and activate QN02.

When the 24 Vp/p positive vertical blanking pulse is missing from the base of QN05, it will be turned off, which will cause the collector to go high because CN03 charges up through RN11. This in turn will cause QN04 to turn on because its base pulls up high, creating an increase of current flow from emitter to collector and up through RN08, (which is located across the emitter base junction of QN02), to the SW +11V supply. This increase of current flow through RN08 will bias on QN02 and the events described in "Spot Circuit Activation" above will occur.

Loss of Horizontal Blanking (H Blk)

The Horizontal pulse at the base of QN01 switches QN01 on and off at the horizontal rate. This discharges CN02 sufficiently to prevent the base of QN03 from going high to turn it on and activate QN02.

When the 11.6 Vp/p positive horizontal blanking pulse is missing from the base of QN01, it will be turned off, which will cause the collector to go high through DN03, RN02 and SW +11V as CN02 charges. This in turn will cause QN03 to turn on because its base is pulled up high when DN02 fires. When QN03 turns on, an increase of current flow from emitter to collector, through RN07, and up through RN08. This increase of current flow through RN08 will bias on QN02 and the events described in "Spot Circuit Activation" above will occur.

The Digital Convergence circuit is responsible for maintaining proper convergence of all three colors being produced by the CRTs. Many different abnormalities can be quickly corrected by running HD FOCUS.

The Digital convergence Interconnect Diagram depicts how the Digital Convergence Circuit is interfaced with the rest of the Projection's circuits. The main components and/or circuits are;

- THE DIGITAL CONVERGENCE UNIT (DCU)
- INFRARED REMOTE RECEIVER
- ON SCREEN DISPLAY PATH
- CONVERGENCE OUTPUT STKs
- CONVERGENCE YOKES

CIRCUIT DESCRIPTIONS

- HD FOCUS SENSORS AND INTERFACE
- MICROPROCESSOR
- RAINFOREST IC (Video Processor).
- SERVICE ONLY SWITCH
- MAGIC FOCUS (HD Focus) activation control.

THE DIGITAL CONVERGENCE UNIT (DCU)

The DCU is the heart of the Digital convergence circuit. Held within are all the necessary components for generating the necessary waveforms for correction, and associated memories for the adjustment data and Magic Focus Data.

The Block above shows the relationship of the DCU to the rest of the set. Note that the light being produced by the CRTs is what is used by the sensors for Magic Focus. This allows the DCU to make adjustments regardless of circuit changes, by actually using the light on the screen to make judgments.

EEPROM AND SRAM

Each color can be adjusted in any one of 117 different locations. The internal workings of the DCU can actually make 256 adjustment points per color. These adjustment points are actual digital data stored in memory. This data represents a specific correction signal for that specific location. When the Service Technician makes any adjustment, the new information must be stored in the EEPROM. The EEPROM only stores the 117 different adjustment points data, the SRAM interpolates to come up the additional 139 adjustment points for a total of 256 per color. The EEPROM data is slow in relationship to the actual deflection raster change. The SRAM is a very fast memory. So, during the first application of AC power, the EEPROM data is read and the SRAM makes the interpolation. As long as power remains, interpolation no longer has to be made.

This can be seen during an adjustment. If the Interpolation key is pressed on the remote control, the SRAM must make those additional calculations beyond the 117 made by the Servicer and this is all placed into memory.

INFRARED REMOTE CONTROL INPUT

The Infrared Remote control signals manipulate the internal data when the Service Only Switch is pressed on the Deflection PWB. This process prevents the Microprocessor from responding to Remote commands, via a Busy line output from the DCU.

INTERNAL CONTROLLER, D/A CONVERTERS

The internal controller, takes the stored data and converts it to a complex Convergence correction waveform for each color. The Data is converted through the D/A converter, 1st and 2nd sample and hold, the Low Pass Filter that smooths out the parasitic harmonic pulses from the digital circuit and the output Clamp that fixes the DC offset level.

The DC offset voltage is adjusted by several things.

When a complete Digital Convergence procedure has been performed and the adjustment information stored in memory by pressing the MULTI button twice, it is necessary to run Sensor Initialization. This is done by pressing the MULTI button on the remote once, then pressing the PinP Ch button. This begins a preprogrammed production of different light patterns. HD Focus memorizes the characteristics of the light pattern produced by the digital convergence module. If a convergence touchup is required in the future, the customer simply activates HD Focus via the Customer's Menu and the set begins another preprogrammed production of different light patterns. This automated process that duplicates the same light pattern it memorized from the initialization process, re-aligns the set to the memorized convergence condition.

"HD FOCUS" SENSORS

This process is a joint effort between the digital convergence module and 4 Photo-sensors, physically located on the middle edges of the cabinet, just behind the screen. The physical placement of the sensors assures that they will not produce a shadow on the screen that can be seen by the customer.

HD Focus is activated when the customer selects HD Focus in the Customer's Menu. An on-screen graphic will be displayed to confirm that the automatic convergence mode (HD Focus) has begun.

The digital convergence module produces different patterns for each CRT, and the sensors pick up the transmitted light, generate a DC voltage. This voltage is sent to the DCU and converted to digital data and compared with the memorized sensor initialization data. Distinct patterns will be generated in each primary color. As the process continues, the digital module manipulates the convergence correction waveforms that it is producing to force the convergence back into the original memorized configuration.

When all cycles have been completed, the set will return to the original signal and the convergence will be corrected. In most cases, activating HD Focus will allow the set to correct itself, without further adjustments.

EXPLANATION OF THE DIGITAL CONVERGENCE INTERCONNECT DIAGRAM:

INFRARED RECEIVER:

During normal operation, the IR receiver directs its signal to the Main Microprocessor where it interprets the incoming signal and performs a predefined set of operations. However, when the Service Only Switch is pressed, the Main Microprocessor must ignore remote control commands. Now the DCU receives these commands and interprets them accordingly. The Microprocessor is notified when the DCU begins its operation by

CIRCUIT DESCRIPTIONS

the BUSY line. As long as the BUSY line is active, the Main Microprocessor ignores the IR signal.

ON SCREEN DISPLAY PATH:

MICROPROCESSOR SOURCE FOR OSD:

The On Screen Display signal path is shown with the normal OSD information such as Channel Numbers, Volume Graphic Bar, Main Menu, sent from the Main Microprocessor to the Rainforest IC IC01 pins 37, 38 and 39. These are positive pulses, about 5 V p/p and about 3µS in length dependant upon their actual horizontal time for display.

DCU SOURCE FOR OSD:

When the Service Only switch is pressed, the Main Microprocessor knows the DCU is Busy as described before. Now the On Screen Display path is from the DCU to the Rainforest IC IC01 pins 33, 34 and 35.

The output for the DCU OSD characters is from the PDG connector pins (11 Dig Red, 12 Dig Green and 13 Dig Blue). These are routed through their buffers (QK06 Dig Red, QK07 Dig Green and QK08 Dig Blue) to the PDK1 connector pins (2 Dig Red, 4 Dig Green and 5 Dig Blue) then through their buffers, (QC24 Dig Red, QC23 Dig Green and QC22 Dig Blue). Then it arrives at the Rainforest IC IC01 at pins (35 Dig Red, 34 Dig Green and 33 Dig Blue). When a character pulse arrives at any of these pins, the internal color amp is saturated and the output is generated to the CRTs. Any combination of these inputs generates either the primary color Red, Green or Blue or the complementary color Red and Green which creates Yellow, Red and Blue which creates Magenta or Green and Blue which creates Cyan.

OUTPUT STKs:

These are output amplifiers that take the correction waveforms generated by the DCU and amplify them to be used by the Convergence Yoke assemblies for each color.

RV is Red Vertical Convergence correction. Adjust the location either up or down.

RH is Red Horizontal Convergence correction. Adjust the location either left or right.

GV is Green Vertical Convergence correction. Adjust the location either up or down.

GH is Green Horizontal Convergence correction. Adjust the location either left or right.

BV is Blue Vertical Convergence correction. Adjust the location either up or down.

BH is Blue Horizontal Convergence correction. Adjust the location either left or right.

CONVERGENCE YOKES:

Each CRT has a Deflection Yoke and a Convergence Yoke assembly. The Deflection manipulates the beam in accordance to the waveforms produced within the Hori-

zontal Deflection circuit or the Vertical Deflection circuit. The Convergence Yoke assembly manipulates the Beam in accordance with the correction waveforms produced by the DCU.

HD FOCUS (MAGIC FOCUS) SENSORS AND INTERFACE:

Each of the four photo cells, called solar batteries, has its own amp which develops the DC potential produced by the cells. Each amp is routed through the PDS1 connector and arrives at the PDS connector on the DCU where the DCU converts this DC voltage to Digital signals. These digital signals are used only when HD Focus is activated via the Customer's Menu and HD Focus runs.

MICROPROCESSOR:

The Microprocessor is only involved in the Digital Convergence circuit related to IR (Infrared Remote Control Signals). When the DCU is put into the Digital Convergence Adjustment Mode, DCAM or HD Focus is running, the Microprocessor ignores IR pulses. This is accomplished by the BUSY signal from the DCU. The BUSY signal is routed from the DCU out the PDG connector pin 10, to the PDK1 connector pin 1, then the PSD1 connector pin 1 to the DAC1 I006 pin 1. Through I²C data communications SCL1 and SDA1, the DAC1 IC tell the microprocessor that the DCU is busy.

RAINFOREST IC (Video Processor):

The Rainforest IC, IC01 is only involved with the Digital Convergence circuit related to the OSD path.

SERVICE ONLY SWITCH:

The Service Only Switch is located just in front of the Digital Convergence Module on the Convergence PWB. If the front speaker grill is removed and the front access panel is opened, the switch will be on the far left hand side. When this button is pressed with the TV ON, the DCU enters the DCAM, (Digital Convergence Adjustment Mode).

If the button is pressed and held down with the TV OFF and the power button is pressed and released, the Digital Convergence RAM is cleared. Then, by releasing the Service Only Switch, the DCU Grid appears. In the Cleared RAM state, there is no influence from the DCU related to beam deflection. Magnetic centering, Red and Blue center offset and other adjustments requiring no influence from the DCU are performed in this mode as well as the ability to enter the 3X3, (9 adjustment points) mode.

ABL VOLTAGE OPERATION

The ABL voltage is generated from the ABL pin (3) of the Flyback transformer, TH01. The ABL pull-up resistors are RH27 and RH28. They receive their pull up voltage from the B+ (115V2) line for Deflection generated from the Power Supply via TP91 pin 11, rectified by DP15, filtered by CP32 and then routed through the excessive current sensing resistor RP24.

CIRCUIT DESCRIPTIONS

The ABL voltage is determined by the current draw through the Flyback transformer. As the picture brightness becomes brighter or increases, the demand for replacement of the High Voltage being consumed is greater. In this case, the flyback will work harder and the current through the Flyback increases. This in turn will decrease the ABL voltage. The ABL voltage is inversely proportionate to screen brightness.

Also connected to the ABL voltage line is DH16. This zener diode acts as a clamp for the ABL voltage. If the ABL voltage tries to increase above 11V due to a dark scene which decreases the current demand on the flyback, the ABL voltage will rise to the point that DH16 dumps the excess voltage into the 11 line.

ACCL TRANSISTOR OPERATION

The ABL voltage is routed through the PSD2 connector pin 2, through the acceleration circuit RC62 and DC02 to the base of QX18. Under normal conditions, this transistor is nearly saturated. QX18 determines the voltage being supplied to the cathode of DC01, which is connected to pin 53 of the Rainforest IC, IC01. During an ABL voltage decrease due to an excessive bright circumstance, the base of QX18 will go down, this will drop the emitter voltage which in turn drops the cathode voltage of DC01. This in turn will pull voltage away from pin 53 of the Rainforest IC, IC01. Internally, this reduces the contrast and brightness voltage which is being controlled by the I²C bus data communication from the Microprocessor arriving at pins 30 and 31 of the Rainforest IC and reduces the overall brightness, preventing blooming as well as reducing the Color saturation level to prevent color smear.

MAIN MICROPROCESSOR

OVERVIEW

The Microprocessor must keep communication with the Chassis to maintain control over the individual circuits. Some of the circuits must return information as well so the Microprocessor will know how to respond to different requests.

The Microprocessor uses a combination of I²C Bus communication and the Serial Data, Clock and Load lines for control. The I²C communication scheme only requires 2 lines for control. These lines are called SDA and SCL. Serial Data and Serial Clock respectively.

The Microprocessor also requires the use of what are called Fan Out IC or DACs, (Digital to Analog Converters). This allows the Microprocessor to use only two lines to control many different circuits.

Also, due to the fact that this Microprocessor operates at the new 3.3Vdc voltage, it requires a Level Shift IC to bring up the DC level of the control lines to make it compatible with the connected ICs.

The Microprocessor communicates with the following ICs:

ON THE SIGNAL PWB

Main Tuner U501
PinP Tuner U502
EEPROM I002
Flex Converter I301
DAC1 I006
DAC3 I007
Level Shift I004
3D Y/C I301
Main Video Chroma I501
Rainforest IC01

ON THE TERMINAL PWB

A/V Selector IX01
Sub Video Chroma IX03
Main Y Pr/Pb Selector IX04
Sub Y Pr/Pb Selector IX05

ON THE SURROUND PWB

Front Audio Control IA01

DATA COMMUNICATION

The following explanations deal with the communication paths used between the Microprocessor and the respective ICs.

ON THE SIGNAL PWB

Main Tuner U501 (with MTS outputs). The Microprocessor controls the Main Tuner by SDA (Data) and SCL (Clock) I²C communication lines. SCL1 and SDA1 lines for the Main Tuner are output from the Microprocessor at pins 2 (SDA1) and 3 (SCL1) respectively. These lines go directly to the Main Tuner, SDA1 at pin (5) and SCL1 at pin (4). These lines control band switching, programmable divider set-up information, pulse swallow tuning selection, etc.

PINP TUNER U502

The Microprocessor controls the Main Tuner by SDA (Data) and SCL (Clock) I²C communication lines. SCL1 and SDA1 lines for the Main Tuner are output from the Microprocessor at pins (2 SDA1 and 3 SCL1) respectively. These lines go directly to the Main Tuner, SDA1 at pin (5) and SCL1 at pin (4). These lines control band switching, programmable divider set-up information, pulse swallow tuning selection.

EEPROM I003

The EEPROM is ROM for many different functions of the Microprocessor. Channel Scan or Memory List, Customer set ups for Video, Audio, Surround are memorized as well. Also, some of the Microprocessors internal sub routines have variables that are stored

CIRCUIT DESCRIPTIONS

in the EEPROM, such as the window for Closed Caption detection.

Data and Clock lines are SDA1 from pin (2) of the Microprocessor to pin (5) of the EEPROM and SCL2 from pin (3) of the Microprocessor to pin (6) of the EEPROM. Data travels in both directions on the Data line.

FLEX CONVERTER UC01

The projection television is capable of displaying NTSC as well as ATSC (DTV) including HD (High Definition). The Flex Converter is responsible for receiving any video input and converting it to 33.75 KHz output. This output is controlled by sync and by the customer's menu and how it is set up. The set up can be 4X3 or 16X9 for DTV, or letterbox. This set also has something called "Through Mode". This bypasses the Flex Converter completely and inputs the 1080i signal directly to the Rainforest IC. The Rainforest IC then outputs the signal directly. The Flex Converter can take any NTSC, S-In, Component, NTSC or Progressive, Interlaced, 480I, 720P, 1080i signal.

Control for the Flex Converter is Clock, Data and Enable lines. Clock, Data and Enable lines for the Flex Converter are output from the Microprocessor at pins (45) Data and (46) FCENABLE. The FCENABLE line is routed through the PFC1 connector pin 12 and the FCDATA line is routed through the PFC1 connector pin 11.

The Clock line must be routed through the Level Shift IC I004 to be brought up to 5V. The Microprocessor output for Clock is pin 58, it arrives at I004 at pins (3) Clock and is output at pins (17). It arrives at the Flex Converter through the PFC1 connector pin 10.

DAC1 I006

This Digital to Analog converter acts as an extension of the Microprocessor. Sometimes called an Expansion IC. The purpose of this IC is to reduce the number of pins, (fan out) of the Main Microprocessor I001. The Main Microprocessor sends Clock and Data via I²C bus to the DAC1 IC. The output from the Microprocessor is pin (2) SDA1 and (3) SCL1 which arrives at the DAC1 IC I006 at pins (5 and 6) respectively.

DAC3 I007

This Digital to Analog converter acts as an extension of the Microprocessor. Sometimes called an Expansion IC. The purpose of this IC is to reduce the number of pins, (fan out) of the Main Microprocessor I001. The Main Microprocessor sends Clock and Data via I²C bus to the DAC3 IC. The output from the Microprocessor is pin (2) (SDA1) and 3 (SCL1) which arrives at the DAC3 IC at pins 5 and 6 respectively.

DAC1 I006 Pin Descriptions		
PIN	DESC	FUNCTION
1	Busy	Receives Busy from DCU stopping Microprocessor from responding to Remote commands.
2	ST Det	Receives the Low from the Main Tuner indicating Stereo signal received.
3	MTS	Places the Main Tuner into MTS mode if Stereo MTS Detected by Microprocessor
4	F Mono	Places the Main Tuner into Forced MONO mode
5	Ant	Switches the antenna block into Antenna A or Antenna B when selected.
6	Cut Off	In Service Mode, if Set Up is selected, outputs High to collapse Vertical circuit and inhibit Vert. Sweep Loss Detection
7	Magic Sw	Places the Unit into HD Focus Mode.
8	Gnd	Ground
9	D Size	During HD Focus and Sensor Initialize, the H and V Size has to be increased slightly for Sensor striking purposes.
10	SAP Det	Receives the Low from the Main Tuner indicating SAP signal received.
11	Gnd	Ground Not Used
12	Gnd	Ground Not Used
13	STBY 5V	Standby +5 Volt input.
14	SDA1	Serial Data from Microprocessor
15	SCL1	Serial Clock from Microprocessor
16	SBY +5V	Vcc SBY +5V

NOTE: Pin 1 Busy and Pin 9 D Size works as a tri-data-level-input. The Digital Convergence Module is active during Service Adjustment (DCAM), HD Focus and/or Sensor Initialize.

LEVEL SHIFT I004

The Microprocessor operates at 3.3Vdc. Most of the Circuits controlled by the Microprocessor operate at 5Vdc. The Level Shift IC steps up the DC voltage to accommodate.

- Pin 4 outputs a Clock, used by the Flex Converter
- Pin 11 outputs Error Mute signal (ERRMUTE), used to mute the Out to Hi-Fi jacks on the SRS PWB.
- Pin 13 outputs a Front Speaker Off signal (FSPOFF), used to turn off the internal speakers.

3D Y/C I301

(IC mounted directly on the Signal PWB)

The 3D Y/C IC is a Luminance/Chrominance separator, as well as a 3D adder. Separation takes place digitally. Using advanced separation technology, this module separates using multiple lines and doesn't produce dot pattern interference or dot crawl. The 3D effect is a process of adding additional emphasis signals to the Luminance and Chrominance. These signals relate specifically to transitions. Transitions are the point where the signal goes from dark to light or vice versa. The 3D adds a little more black before the transition goes to white and a little more white just before it gets to white. It also adds a little more white just before it goes dark

CIRCUIT DESCRIPTIONS

and a little more dark just before it arrives. This gives the impression that the signal pops out of the screen or a 3D effect.

The Microprocessor communicates with the 3D Y/C IC via I²C bus data and clock. The communications ports from the Microprocessor are pins 59 (SDA2) and 60 (SCL2) to the 3D Y/C I301 pins (59 and 60) respectively.

DAC3 I007 Pin Descriptions		
PIN	DESC	FUNCTION
1	Sig Det	Detects active Sync from Component Y signal for 3 or 4
2	IR Det	Detects IR from Remote for Auto Link Remote Set Up. (Not in Zenith Chassis)
3	P Vol	Activates SoundRite determined by Customer
4	AC3 Info	T3 (Factory Use)
5	FH Det Out 1	T3 (Factory Use)
6	FH Det Out 2	T3 (Factory Use)
7	FC Blue Back	T7 (Factory Use)
8	Gnd	Ground
9	Magic Sw In	Not Used in Zenith Chassis (No Switch on Front Control Panel)
10	IN5DET	Detect Pr/Cr plug insertion for Component 4 input, if none then Composite is determined.
11	Gnd	Ground Not Used
12	Gnd	Ground Not Used
13	Gnd	Ground Not Used
14	SDA	Data I2C communications between DAC2 and Microprocessor
15	SCL	Clock I2C communications between DAC2 and Microprocessor
16	Vcc	IC B+. (STBY +5V).

NOTE: Pin 2 The IR pulse from the Remote Control is monitored when Auto Link is set.

The Microprocessor also is able to turn on and off circuits within the 3D Y/C circuit determined by customer menu set-up.

MAIN VIDEO CHROMA I501 (PREPARATION IC)

The Main Video Chroma IC processes the video and chroma from the 3D Y/C circuit for the main picture and prepares it for the Flex Converter. It converts video into Y and chroma into Cr/Cb (NTSC Only). Communication from the Microprocessor via pins 59 (SDA2) and 60 (SCL2) to I501 pins (34 and 33) respectively.

RAINFOREST IC01 (VIDEO/CHROMA PROCESSOR)

The Video Processing IC (Rainforest) is responsible for controlling video/chroma processing before the signal is made available to the CRTs. Some of the emphasis circuits are controlled by the customer's menu and some of them are controlled by WEAK SIGNAL in Zenith Models which is AI, (Artificial Intelligence).

Communication from the Microprocessor via pins (59) SDA2 and (60) SCL2 to the Rainforest IC pins (31 and 30) respectively.

ON THE TERMINAL PWB

A/V SELECTOR IX01

The A/V Selector IC is responsible for selecting the input source for the Main Picture as well as the source for the PinP or Sub picture. Communication from the Microprocessor via pins (2) SDA1 and (3) SCL1 to the PST1 connector pins (5 and 4) respectively then to IX01 pins (34 and 33) respectively.

SUB VIDEO CHROMA IX03

The Sub Video Chroma IC processes the video and chroma for the Sub or PinP picture. It converts Luminance into Y and Chroma into Cr/Cb (NTSC Only). Communication from the Microprocessor via pins (59) SDA2 and (60) SCL2 to connector PST1 pins (8 and 7) to IX03 pins (34 and 33) respectively.

MAIN Y PR/PB SELECTOR IX04

Any input that is not already in the Y Pr/Pb or Y Cr/Cb state, will have be converted to this state by I501.

The Main Y Pr/Pb Selector IC selects the appropriate input between the Tuner, AV Inputs, S-Inputs or Components. Communication from the Microprocessor via pins (59) SDA2 and (60) SCL2 to connector PST1 pins (8 and 7) to IX04 pins (31 and 30) respectively.

SUB Y PR/PB SELECTOR IX04

Any Sub input that is not already in the Y Pr/Pb or Y Cr/Cb state, will have be converted to this state by IX03.

The Sub Y Pr/Pb Selector IC selects the appropriate input between the Tuner, AV Inputs, S-Inputs or Components. Communication from the Microprocessor via pins (59) SDA2 and (60) SCL2 to connector PST1 pins (8 and 7) to IX05 pins (31 and 30) respectively.

FRONT AUDIO CONTROL IC IA01

Audio control is performed by this IC. Selection for different Audio modes, volume, bass, treble. The Main Microprocessor sends Clock and Data via I²C bus to this IC. The output from the Microprocessor is pins (59) SDA2 and (60) SCL2 respectively then through the connector PSU1 pins (2 and 1) which arrives at IA01 at pins (4 and 5) respectively.

Microprocessor Data Communications circuit diagram.

The Microprocessor must keep in communication with the Chassis to maintain control over the individual circuits. Some of the circuits must return information as well so the Microprocessor will know how to respond to different requests.

CIRCUIT DESCRIPTIONS

The Microprocessor uses a combination of I²C Bus communication and the Serial Data, Clock and Load lines for control. The I²C communication scheme only requires 2 lines for control. These lines are called SDA and SCL. Serial Data and Serial Clock respectively.

SRS AUDIO +29V REGULATOR INDICATED BY D912.

The SRS Audio +29V supply is generated from pin (8) of T901. This output is rectified by D910 and filtered by C915. The choke L912 adds further filtration and C917 removes high frequency switching noise. This supply is routed to the SRS Audio Output IC IJ01 via the connector PAQ1 pin 1 and 2.

This voltage is what illuminates the Green Visual Trouble Shooting LED, D912.

SERVICE ADJUSTMENTS

SERVICE ADJUSTMENTS

ZP-25 CHASSIS ADJUSTMENT ORDER

Always follow the sequence below.

Order	Adjustment Item	Screen Format	Signal	DCU Data
	Pre HEAT (30 Minutes)	Normal Mode	NTSC	N/A
1	Cut Off	Normal Mode	NTSC	N/A
2	Pre Focus Lens and Static	Normal Mode	NTSC	N/A
3	DCU Phase Data Setting	Normal Mode	NTSC	N/A
5	Horz. Position Adj. (Coarse)	Normal Mode	NTSC	N/A
6	Horz. Position Adj. (Coarse)	1080i HD	2.14H	N/A
7	Raster Tilt	Normal Mode	NTSC	CLEAR
8	Beam Alignment	Normal Mode	NTSC	CLEAR
9	Raster Position	Normal Mode	NTSC	CLEAR
10	Vertical Size Adjust	Normal Mode	NTSC	CLEAR
11	Horz. Size Adjust	Normal Mode	NTSC	CLEAR
12	Beam Form	Normal Mode	NTSC	
13	Lens Focus Adjust	Normal Mode	NTSC	
14	Static Focus Adjust	Normal Mode	NTSC	
15	Blue Defocus	Normal Mode	NTSC Color Bar	
16	White Balance Adjustment	Normal Mode	NTSC	
17	Sub Brightness Adjustment	Normal Mode	NTSC	
18	Sub Picture Adjustment	Normal Mode	NTSC	
19	Horz. Position Adjust (Fine)	Normal Mode	NTSC	
20	Horz. Position Adjust (Fine)	16X9 HD	2.14H	
21	DCU Character Set Up	Normal Mode	NTSC	
22	DCU Character Set Up	16X9 HD	2.14H	
22	DCU Pattern Set Up	Normal Mode	NTSC	
23	DCU Pattern Set Up	16X9 HD	2.14H	
24	Convergence Alignment	Normal Mode	NTSC	CLEAR
25	HD Focus Sensor Initialize	Normal Mode	NTSC	
26	HD Focus Error Codes	Normal Mode	NTSC	
27	PIP Amplitude Adjustment	Normal Mode	NTSC	
28	Memory Initialization Procedure	Normal Mode	NTSC	

SERVICE ADJUSTMENTS

CHASSIS PRE-HEAT RUN ADJUSTMENTS

PRESET EACH ADJUSTMENT VR TO THE CONDITION SHOWN: BEFORE PRE HEAT RUN.

1. Red and Green Drive VR on the CRT PWB. This is part of the I²C Service Menu. Set each to 3F. To Enter Service Menu, press the SOURCE button and hold, then press the Power Button. Set comes on and displays Service Menu.
2. SCREEN VR ON FOCUS PACK. Pre Set fully counter-clockwise.
3. Focus VR on focus pack Pre Set fully clockwise.
4. Allow set to operate at least 30 Minutes before beginning adjustments.

CHASSIS CUT-OFF (SCREENS) ADJUSTMENT

ADJUSTMENT PREPARATION:

- Pre Heat Run should be finished.
- Be sure Screen Color Temperature setting is in the COOL mode
- Room Light should be minimal.

ADJUSTMENT PROCEDURE:

1. Go to I²C ADJ. Mode. (With power Off, press the SOURCE button on the front panel and hold down, then press the POWER ON button and release both buttons. The Service Menu is displayed.)
2. Set R DRV (COOL) to center data value (3F).
3. Set G DRV (COOL) to center data value (3F).
4. Confirm that the R, G, and B CUTOFF (COOL) data settings are [80].
5. Adjust Screen VRs on Focus Pack fully counter clockwise.
6. Choose SERVICE item [1] of I²C ADJ. Mode. Select CURSOR RIGHT and the Vertical will collapse.
7. Adjust any Screen VR. Screen VR should be turned clockwise gradually until that particular color is barely visible.
8. Repeat for the other two colors.
9. Exit SERVICE by pressing the CURSOR LEFT on remote.
10. Exit SERVICE MENU by pressing the MENU key on the remote.

CHASSIS PRE-FOCUS ADJUSTMENT

ADJUSTMENT PREPARATION:

Pre Heat Run should be finished.

FOCUS ADJUSTMENT:

1. Short the 2pin sub-miniature connector on the CRT PWB (PTS), to remove any color not being adjusted and adjust one color at a time. (The adjustment order of R, G and B is just an example.) PTSR for RED, PTSG for GREEN and PTSB for BLUE.
2. Adjust the Focus VR for Red until Focus is achieved. (A Fine Adjustment will be made later.)

3. Repeat for Blue and Green.

DCU CROSSHATCH PHASE ADJUSTMENT

ADJUSTMENT PREPARATION:

- Cut Off adjustment should be finished.
- Video Control: Brightness 90%, Contrast Max.

ADJUSTMENT PROCEDURE: NORMAL MODE

1. Receive any NTSC signal.
2. Press the SERVICE ONLY switch on the Convergence PWB to enter DCAM mode and display DCU grid.
3. Change the Remote Control into VCR mode.
4. Press the (-) key on the Remote, Green Cross hatch appears.
5. Change the Remote Control into TV mode.
6. Press the QUIT key. (This is the Phase adjustment mode).
7. Adjust data value using the keys indicated in the chart below, until the data matches the values indicated in the chart.

Saving Data Values:

8. Change the Remote Control into VCR mode.
9. Press the (-) key on the Remote to exit phase mode.
10. Change Remote Control into TV mode.
11. Press MULTI key TWICE to store the information.
12. When Green dots are displayed, press the MUTE key on remote.
13. Press the SERVICE ONLY switch to return to normal video mode.

PHASE MODE	Display Format	NORMAL	Data
ADJUST ING	Address	Data Value	
4 and 6 keys on Remote	PH-H	BF	
2 and 5 keys on Remote	PH-V	07	
Cursor Left t and Right u on Remote	CR-H	4C	
Cursor Up p and Down q on Remote	CR-V	0C	

CHASSIS HORIZONTAL PHASE (COARSE) ADJUSTMENT

ADJUSTMENT PREPARATION:

- Cut Off, DCU Phase adjustments should be finished.
- Video Control: Brightness 90%, Contrast Max.

ADJUSTMENT PROCEDURE WIDE MODE:

1. Receive any NTSC crosshair signal.
2. Screen Format is WIDE.
3. Press the SERVICE ONLY switch on the convergence PWB and display the Digital Convergence Cross-hatch pattern.
4. Mark the center of the Digital Convergence Cross-hatch Pattern with finger and press the SERVICE ONLY switch to return to normal mode.
5. Enter the I²C Bus alignment menu (With Power Off, press and hold the SOURCE button on the front panel, then press the POWER button and Release both buttons).

SERVICE ADJUSTMENTS

6. Select Item H POSI and adjust the data so that the center of Video matches the location of the Digital Crosshatch pattern noted in step {4}.
7. Exit from the I²C Menu.

1080I HD MODE ADJUSTMENT:

1. Receive any 1080i (2.14H) signal and select that input.
2. Press the SERVICE ONLY switch on the deflection PWB and display the Digital Convergence Crosshatch pattern.
3. Mark the center of the Digital Convergence Crosshatch Pattern with finger and press the SERVICE ONLY switch to return to normal mode.
4. Enter the I²C Bus alignment menu (With Power Off, press and hold the SOURCE button on the front panel, then press the POWER button and Release both buttons).
5. Select Item H POSI H
6. Adjust the data up or down slightly to match the Video to the center location found in step (10).
7. Exit from the I²C Menu.

NOTE: To enter the I²C Bus alignment menu, with Power Off, press the SOURCE button on the front panel and hold it down, then press the POWER button and release both buttons. I²C adjustment menu will appear.

CHASSIS TILT (RASTER INCLINATION) ADJUSTMENT

ADJUSTMENT PREPARATION:

- The set can face any direction.
- Receive the Cross-Hatch Signal
- VIDEO CONTROLS: Factory Preset.
- SCREEN FORMAT: should be NORMAL mode.
- The lens focus should have been coarse adjusted.
- The electrical focus should have been coarse adjusted.
- The Digital Convergence RAM should be cleared.
- Turn power off, press and hold the SERVICE ONLY switch on the Convergence PWB, then press the POWER button.

ADJUSTMENT PROCEDURE:

GREEN:

1. Apply covers to the RED and BLUE lenses or short the 2P Sub Mini connector [PTS] on R&B CRT PWB to produce only GREEN.
2. Turn the Green deflection yoke and adjust the TILT until the green is level. [+/- 2mm tolerance]. See diagram.

RED:

3. Remove cover or PTS short from RED CRT and align RED with GREEN. [+/- 1mm tolerance when compared to Green]

BLUE:

4. Remove cover or PTS short from BLUE and cover the RED CRT. Align BLUE with GREEN. [+/- 1mm tolerance when compared to Green]

After Completion:

5. Tighten DY Yoke Screws to 12+/-2 kg-cm.
6. REMOVE ALL COVERS or SHORTS on the PTS connectors.
7. Turn the Power Off.

CHASSIS BEAM ALIGNMENT ADJUSTMENT

PREPARATION FOR ADJUSTMENT:

- Pre Heat, Pre-optical focus, DCU Phase Data, H. POSI Course and Raster Tilt adjustment should be completed.
- Brightness: 90%
- Contrast Max.
- Receive cross hatch signals, or dot pattern
- RASTER TILT adjustment should be finished.
- SCREEN FORMAT should be NORMAL mode.

Adjustment procedure:

1. Green (G) tube beam alignment adjustment:
2. Short-circuit 2P subminiature connector plug PTS of Red (R) and Blue (B) on the CRT boards and project only Green (G).
3. Put Green (G) tube beam alignment magnet to the cancel state as shown in Figure 1. (See Figure 1.)
4. Turn the Green (G) static focus VR counterclockwise all the way and make sure of position of cross hatch center on screen.
5. Turn Green (G) static focus VR clockwise all the way.
6. Turn two Beam alignment magnet in any desired direction and move cross hatch center to position found in step (3). (See Figure 2 below).
7. If image position does not shift when Green static focus VR is turned, adjustment is complete.
8. If image position does move, repeat steps [2] through [6].
9. Conduct beam alignment for Red and Blue in the same way.
10. Red (R) focus on focus pack.
11. Blue (B) focus on focus pack.
12. Upon completion of adjustment, place a small amount of white paint on the beam alignment magnets, to assure they don't move.

CHASSIS RED/BLUE RASTER OFFSET ADJUSTMENT

Raster Offset is necessary to conserve Memory allocation. It is very important to remember that the Red is offset

SERVICE ADJUSTMENTS

Left of Center and Blue is offset Right of center. Please use the following information to accurately offset Red and Blue from center. Also see Overlay Dimensions for further details.

PREPARATION FOR ADJUSTMENT:

- Video Control should be set at Factory Preset condition.
- Static Focus adjustment should be finished.

ADJUSTMENT PROCEDURE

1. With Power Off, press the Service Only switch on the Convergence PWB. While holding the Service Only Switch down, press the Power On button. Picture will appear without convergence correction.
2. Press the Service Only Switch to receive the DCU cross-hatch signal.
3. Turn the centering magnets of Red, Green and Blue and adjust so that the center point of the cross-hatch pattern satisfies the diagram below. (DCU data is cleared). Remember Green is Centered. Red is to the left of Green and Blue is to the right of Green as indicated below.
 - o All Vertical positions are geometric center of screen.
 - o Parameters are +/- 2mm.

MODEL	RED OFFSET LEFT OF CENTER	BLUE OFFSET RIGHT OF CENTER	ASPECT
65"	15mm	25mm	16 X 9
61"	15mm	25mm	16 X 9
56"	15mm	25mm	16 X 9

VERTICAL SIZE ADJUSTMENT

VERTICAL SIZE:

- Receive an NTSC signal.
- Video Control should be set to Factory Preset condition.
- Convergence should not be corrected.

ADJUSTMENT PROCEDURE:

1. With Power Off, press and hold the Service Only Switch on the Convergence PWB, then press the Power Button and Release. (Digital Convergence data is cleared). Then release the Service Only Switch. DCU Grid appears.
2. Adjust using R607 (Vertical Size Adj. VR) to match marks on the Overlay. (See Figure Below)
3. Turn Power Off.

NOTE: Centering magnet may be moved to facilitate. Distance is important, not centering.

ALTERNATE METHOD:

Adjust Vertical Size until the size matches the chart below.

ALTERNATE METHOD:

Adj Vert Size until the size matches the chart below.

Scrn Size	56"	61"	65"
Scrn Format	NORM	NORM	NORM
L=	590	645	690

All Adjustments are +/-5mm

HORIZONTAL SIZE ADJUSTMENT

PREPARATION FOR ADJUSTMENT

- Display Mode NORMAL
- Install the correct Overlay.
- Input an NTSC Signal.
- Digital Convergence RAM should be cleared.
- With Power Off, press the Service Only switch on the Convergence PWB. While holding the Service Only Switch down, press the Power On button and Release. DCU Grid will appear without convergence correction.

NOTE: After entering DCAM, with each press of the Service Only Switch, the picture will toggle between Video mode and DCU Grid.

- Project only the Green raster by selecting Green Adjustment mode and pressing the MENU button.

ADJUSTMENT

1. Adjust using R711 (Horz. Size Adj. VR) to match marks on the Overlay. (See Figure Below)
2. Press "Power Off" to exit DCAM. (Digital Convergence Adjustment Mode.)

ALTERNATE METHOD:

Adj Horiz Size until the size matches the chart below.

Screen Size	56"	61"	65"
Screen Format	NORM	NORM	NORM
L=	1165	1270	1355

All Adjustments are +/-5mm

BEAM FORM ADJUSTMENT

PREPARATION FOR ADJUSTMENT

IMPORTANT: Screen format should be "NORMAL".

1. Pre Heat, Cut-Off, Pre-optical focus, DCU Phase Data, H. Pos Course, Raster Tilt, Beam Alignment, Raster Position, Vertical and Horizontal Size adjustment should be completed.
2. Brightness: 90%, Contrast: Max.
3. Input a NTSC DOT signal.

ADJUSTMENTS PROCEDURE:

4. Green CRT beam shape adjustment.
5. Short-circuit 2P sub-mini connectors on Red and Blue CRT PWB to project only the Green beam.
6. Turn the green static focus VR fully clockwise.
7. Make the dot at the screen center a true circle, using the 4-Pole magnet shown in (Figure 1 be-

SERVICE ADJUSTMENTS

low.)

8. Also adjust the Red and Blue CRT beam shapes according to the steps (1) to (3).
9. After the adjustment is completed, return R, G and B static VRs to the Best Focus point.

LENS FOCUS ADJUSTMENT

PREPARATION FOR ADJUSTMENT

- Receive the Cross-hatch pattern signal.
- The electrical focus adjustment should have been completed.
- Deflection Yoke tilt should have been adjusted.
- Brightness = 50%
- Contrast = 60% to 70%

ADJUSTMENT PROCEDURE

1. Short the 2 pin sub-miniature connector on the CRT PWB PTS, to produce only the color being adjusted and adjust one at a time. (The adjustment order of R, G and B is just an example.)
2. (See Figure 1) Loosen the fixing screw on the lens assembly so that the lens cylinder can be turned. (Be careful not to loosen the screw too much, as this may cause movement of the lens cylinder when tightening.)
3. Rotate the cylinder back and forth to obtain the best focus point, while observing the Cross-Hatch. (Observe the center of the screen). Located just below the screen are the two wooden panels. Remove the panels to allow access to the focus rings on the Lenses.
4. After completing optical focus, tighten the fixing screws for each lens.
5. When adjusting the Green Optical focus, be very careful. Green is the most dominant of the color guns and any error will be easily seen.
6. Repeat Electrical Focus if necessary.

STATIC FOCUS ADJUSTMENT

ADJUSTMENT PREPARATION

- Pre Heat Run should be finished.

FOCUS ADJUSTMENT:

1. Short the 2pin sub-miniature connector on the CRT PWB (PTS) to remove any color not being adjusted and adjust one color at a time. (The adjustment order of R, G and B is just an example.)
2. Adjust the Focus VR for Red until maximum Focus is achieved.
3. Repeat for Blue and Green.

BLUE DE-FOCUS ADJUSTMENT

ADJUSTMENT PREPARATION:

- Video Control: Brightness 90%, Contrast Max.
- SCREEN FORMAT should be NORMAL mode.

ADJUSTMENT PROCEDURE

1. Receive any NTSC crosshatch signal.
2. Turn the B FOCUS VR fully clockwise.
3. Adjust BLUE defocus according to the following specifications. 1mm on each side equaling 2mm total. See figure Below.

WHITE BALANCE AND SUB BRIGHTNESS ADJUSTMENT

ADJUSTMENT CONDITIONS:

- Cut Off and Blue Defocus must be complete.
- High brightness white balance
- Low brightness white balance
- Set Color Temperature to COOL on Customer's Menu.

ADJUSTMENT ITEMS:

- Screen adjustment VRs on Focus Block
- Drive adjustment performed using I²C Bus Alignment within Service Menu.

PREPARATION FOR ADJUSTMENT

- Start adjustment 20 minutes or more after the power is turned on.
- Turn the brightness and black level OSD to minimum by remote control.
- Receive a tuner signal, (any channel, B/W would be best).
- Set the drive adjustments for Green and Red within I²C Service Menu to their Data Centers (3F).

ADJUSTMENT PROCEDURE

Sub Brightness:

1. Go to I²C ADJ. Mode. (With power Off, press and hold the SOURCE button on the front panel, then press the POWER button and release both buttons, Service Menu is displayed.)
2. Adjust the Sub Brightness Number [2] SUBBRT using I²C Bus alignment procedure so only the slightest white portions of the raster can be seen.
3. Exit Service Menu by pressing MENU button.
4. Input a gray scale signal into any Video input and select that input using the INPUT button on the remote or front control panel.
5. Turn the Brightness and Contrast OSD all the way up.
6. Enter I²C the Service Menu again.
7. Make the whites as white as possible using the Red and Green Drive adjustment within I²C Service Menu . (10800K)
8. Exit the Service Menu by pressing the MENU button on remote control.
9. Set the Brightness and Contrast to minimum.
10. Adjust the low brightness areas to black and white, using screen adjustment VRs (red, green, blue) on the Focus Block assembly. (10800 K)
11. Check the high brightness whites again. If not

SERVICE ADJUSTMENTS

OK, repeat steps 5 through 12.

12. Press the MENU key on the remote to Exit Service Menu. Remember: When adjusting the Screen controls, after the Cut Off adjustment has been completed, never adjust the controls clockwise. Always adjust counter clockwise. This lengthens tube life.

CHASSIS HORIZONTAL PHASE (FINE) ADJUSTMENT

ADJUSTMENT PREPARATION:

1. Cut Off, DCU Phase adjustments should be finished.
2. Video Control: Brightness 90%, Contrast Max.

ADJUSTMENT PROCEDURE NORMAL MODE

3. Receive any NTSC crosshair signal.
4. Screen Format is NORMAL.
5. Press the SERVICE ONLY switch on the convergence PWB and display the Digital Convergence Cross-hatch pattern.
6. Mark the center of the Digital Convergence Cross-hatch Pattern with finger and press the SERVICE ONLY switch to return to normal mode.
7. Enter the I²C Bus alignment menu and select Item H POSI and adjust the data so that the center of Video matches the location of the Digital Cross-hatch pattern noted in step {4}.
8. Exit from the I²C Menu.
16X9 HD Mode Adjustment: NOTE: I2C Service Menu Can Not be entered in the 16X9 HD Mode.
9. Receive any 2.14H signal.
10. Change Screen Format 16X9 HD mode.
11. Press the SERVICE ONLY switch on the deflection PWB and display the Digital Convergence Cross-hatch pattern.
12. Mark the center of the Digital Convergence Cross-hatch Pattern with finger and press the SERVICE ONLY switch to return to normal mode.
13. Enter the I²C Bus alignment menu and select Item [9] H POSI
14. Press SELECT key on R/C. (H POSI option is changed to HD mode. H POSI H appears). H POSI of 16X9 HD mode data can be changed.
15. Adjust the data up or down slightly.
16. Exit from the I²C Menu.
17. Change Screen Format to 16X9 HD mode.
18. Confirm that the Center of Video matches the Center of the DCU Crosshatch determined in step (12).
19. If center is not correct, Repeat steps (12) through (18) until center is matched.

NOTE: To enter the I²C Bus alignment menu, with Power Off, press the INPUT button and hold it down, then press the POWER button. I²C adjustment menu will appear.

CHASSIS INTELLISENSE "PATTERN SET UP"

NOTE: This instruction should be applied when a new DCU is being replaced.

NOTE: This instruction shows how to set up the pattern position for Intellisense. Each model has a specific set up pattern position.

ADJUSTMENT PREPARATION:

- Receive NTSC RF or Video Signal.
- With Power Off, Press and HOLD the SERVICE ONLY button on the Convergence/Focus PWB, then press the Power On/Off button and release, picture appears, then release Service Button to bring up Internal Crosshatch.

NOTE: After entering the DCAM, each press of the Service Only Switch will toggle between Video mode and DCU grid.

- Press the C SKIP (twice) to read the old ROM data, DCU Grid returns to normal with convergence correction.

ADJUSTMENT PROCEDURE

1. Make sure the Remote is in TV mode.
2. Press the (-) key on R/C. (One additional line appears near the top and bottom.
3. Change Remote to VCR mode.
4. Press the (-) key. The PATTERN mode is displayed as shown on the right. ———>
5. Change Remote back to TV mode.
6. Use the 6 Key to rotate Arrow. Arrow rotates clockwise with each press on the 6 Key.
7. Use the following Keys to switch color of patterns.
 - o Display : GREEN
 - o 0 : RED
 - o Source : BLUE
8. Press the ? or ? Cursor to change the Pattern Position Data in horizontal Direction to match the chart below.
9. Press the [?] or [?] Cursor keys to change the Pattern Position Data in Vertical Direction to match the chart below.
10. Press the MULTI key 2 times to write the changed data into EEPROM. o First press, ADJ PATTERN ROM WRITE ? is displayed for alarm. o Second press writes data into EEPROM. Green dots appear after completion of operation.
11. Press the MUTE button 2 times to return to the DCU grid.
12. Power set off.

SERVICE ADJUSTMENTS

NORMAL MODE: 0 1 2 3 4 5 6 7

RH X 02 X FE X 02 X 04

RV X 00 X 00 X 02 X 00

GH X 00 X FE X 00 X 04

GV X 00 X 00 X 02 X 00

BH X 00 X FE X 00 X 04

BV X 00 X 00 X 02 X 00

DIGITAL CONVERGENCE ALIGNMENT

There is no way to Calculate using a button on the remote. However, each time the data is saved, it performs the calculate function.

DISPLAY selects GREEN Adj.

0 selects RED Adj.

SOURCE selects BLUE Adj.

SUB PICTURE AMPLITUDE

PREPARATION FOR ADJUSTMENT

- Sub Brightness adjustment should be finished.
- Start adjustment 20 minutes after the power is turned on.

Condition should be set as follows:

- Contrast = MAX
- Brightness = Center
- Press "SPLIT" button on Remote Control. PIP appears on screen
- Select Single mode. Receive NTSC white signal, for the Main Picture and the Sub-Picture. (Do not use Component Signals).
- Connect Probe on the P852 (CRT PWB — Green) to check sub-picture amplitude. Enter I²C adjustment Menu. Press Menu and scroll through pages until TA1270-M appears.

ADJUSTMENT PROCEDURE

1. Go to I²C adjustment Mode.
2. Press "MENU" on remote to scroll through adjustment pages, until TA1270-M appears at the top of the page.
3. Press "PIP CH" on remote control, TA1270-M changes to TA1270-S.
4. Observe P852 on the CRT PWB and change the TA1270-S "SUB CNT" I²C data so that the amplitude of the Sub Picture is the same level as that of the main picture. Shown below.
5. Exit Service Menu.

Adjust SUB CNT until peak white of PinP matches peak white of the main picture.

ZP25 Factory Reset Condition	
ITEM	INITIAL CONDITION
FUNCTION	
NTSC Channel (Main, Sub)	03 CH
SOURCE MODE	Antenna A
SLEEP TIMER	Not Registered
MULTI WINDOW MODE	Off
PIP Mode	Single (Bottom Right)
Freeze Mode	Single (Bottom Right)
SET UP	
SET UP	SET UP
TRILINGUAL LANGUAGE	English
SIGNAL	
Scan	2 ~ 13 CH
CHANNEL Add/Del	--
CLOCK SET	Not Registered
HD FOCUS	--
PICTURE FORMATS	
ASPECT STYLE	Normal
V. POSITION	0
COMPOSITE COLOR TYPE	SDTV/HD
VIDEO DISPLAY	1080i
CUSTOMIZE	
CUSTOMIZE	CUSTOMIZE
CHANNEL LABEL	Not Registered
SOURCE ID	Not Registered
FAVORITE CHANNELS	Not Registered
PARENTAL CONTROLS	Not Registered
SECURITY TIMER	Not Registered
CAPTION / DISPLAY	Not Registered
CLOSED CAPTION	
CCD DISPLAY	Off
CCD MODE	C.C.
CCD CHANNEL	Channel 1
MENU BACKGROUND	Shaded
VIDEO	
VIDEO	VIDEO
CONTRAST	100%
BRIGHTNESS	50%
COLOR	50%
TINT	Center
SHARPNESS	50%
ADVANCED SETTINGS	
LIGHT SENTRY	Off
AUTO FRESH	On
WEAK SIGNAL	Off
COLOR TEMPERATURE	Cool

MODEL PARTS

MODEL PARTS

All HD-S models are module level repair only. Parts contact information is below.

Voice: 1-888-3-ZENITH

Fax: 1-888-6-ZENITH

Mail: ZENITH NATIONAL PARTS

P O Box 240007

Huntsville, AL 35824-6407

R50V26

LOC	PART #	DESCRIPTION
1	NSP	MIRROR MOUNT RIGHT
2	NSP	MIRROR MOUNT LEFT
3	NSP	MIRROR MOUNT UPPER
4	992-10038	MIRROR
5	NSP	CABINET UPPER REAR
6	874-10046	SCREEN ASS. WITH PROTECTOR
7	PART OF 8	ESCUTCHEON UPPER
8	833-10023	ESCUTCHEON ASSY.
9	PART OF 8	ESCUTCHEON LEFT
10	PART OF 8	ESCUTCHEON LOWER
11	PART OF 8	ESCUTCHEON ANGLE BRACKET
12	NSP	MIRROR MOUNT LOWER
13	965-10006	CASTER
14	NSP	FRONT ACCESS COVER (WOOD)
15	809-10810	GRILL
16	849-10055	SPEAKER
17	NSP	BACK CENTER WOOD
18	809-10807	CONTROL PANEL ASY
19	814-10236	CABINET LOWER REAR
20	809-10822	VM SUB PCB
21	809-10726	CRX F-PACK
22	809-10814	DELTA (R,G,B) LENSE
23	809-10811	CONTROL POWER ASS. PWB
24	PART OF 18	FRONT BUTTON ASSY PLASTIC
25	809-10821	SCAN VELOCITY
26	900-10072	CRT B.ASY(B)
27	900-10071	CRT B.ASY(G)
28	809-10823	AUDIO PWB
29	809-10825	SIGNAL PWB
30	809-10824	TERMINAL PWB
31	809-10826	DEFLECTION PWB
32	809-10820	CONVERGENCE PWB
33	809-10844	STAND BY POWER SUPPLY
34	809-10813	CPT PWB ASY
35	845-00340	POWER CORD
36	900-10070	CRT B.ASY(R)
37	895-10143	DEFLECTION YOKE
38	NSP	REAR PORT PANEL PLASTIC
39	809-10735	RF BLOCK
40	874-10054	SCREEN PROTECTOR ONLY
	901-10023	OP GUIDE
	924-10114	REMOTE CONTROL

R56W28

LOC	PART #	DESCRIPTION
1	NSP	MIRROR MOUNT RIGHT
2	NSP	MIRROR MOUNT LEFT
3	NSP	MIRROR MOUNT UPPER
4	992-10047	MIRROR GLASS
5	NSP	BACK UPPER WOOD
6	874-10050	SCREEN ASS. WITH PROTECTOR
7	PART OF 8	ESCUTCHEON UPPER
8	814-10257	ESCUTCHEON ASS.
9	PART OF 8	ESCUTCHEON LEFT/RIGHT SIDE
10	PART OF 8	ESCUTCHEON LOWER
11	PART OF 8	ESCUTCHEON ANGLE BRACKET
12	857-10393	FRONT CENTER PANEL
13	805-10003	MAGIC FOCUS SENSOR ONLY
14	NSP	BACK CENTER WOOD
15	809-10841	SENSOR PWB
16	938-10014	GRILL
17	NSP	FRONT ACCESS COVER (WOOD)
18	849-10055	SPEAKER
19	809-10726	CRX F-PACK
20	809-10836	VM SUB PCB
21	965-10004	CASTER
22	809-10807	CONTROL PANEL ASY
23	809-10806	FRONT CONTROL PWB
24	PRT OF 22	FRONT BUTTON ASSY PLASTIC
25	NSP	LOWER REAR BOARD
26	NSP	REAR PORT PANEL PLASTIC
27	809-10735	AB RF SW ASSY
28	809-10837	AUDIO PWB
29	900-10071	CRT B.ASY(G)
30	900-10072	CRT B.ASY(B)
31	809-10835	SCAN VELOCITY
32	809-10839	SIGNAL PWB
33	809-10838	TERMINAL PWB
34	809-10840	DEFLECTION PWB
35	809-10834	CONVERGENCE PWB
36	809-10855	STAND BY POWER SUPPLY PWB
37	809-10805	ZP14C CPT PWB ASY
38	845-00340	POWER CORD
39	900-10070	CRT B.ASY(R)
40	895-10143	DEFLECTION YOKE
41	971-10024	DELTA (R,G,B) 260 A/B
42	874-10048	SCREEN PROTECTOR ONLY
	206-03282	OP GUIDE
	924-10098	REMOTE CONTROL


MODEL PARTS

R60V26

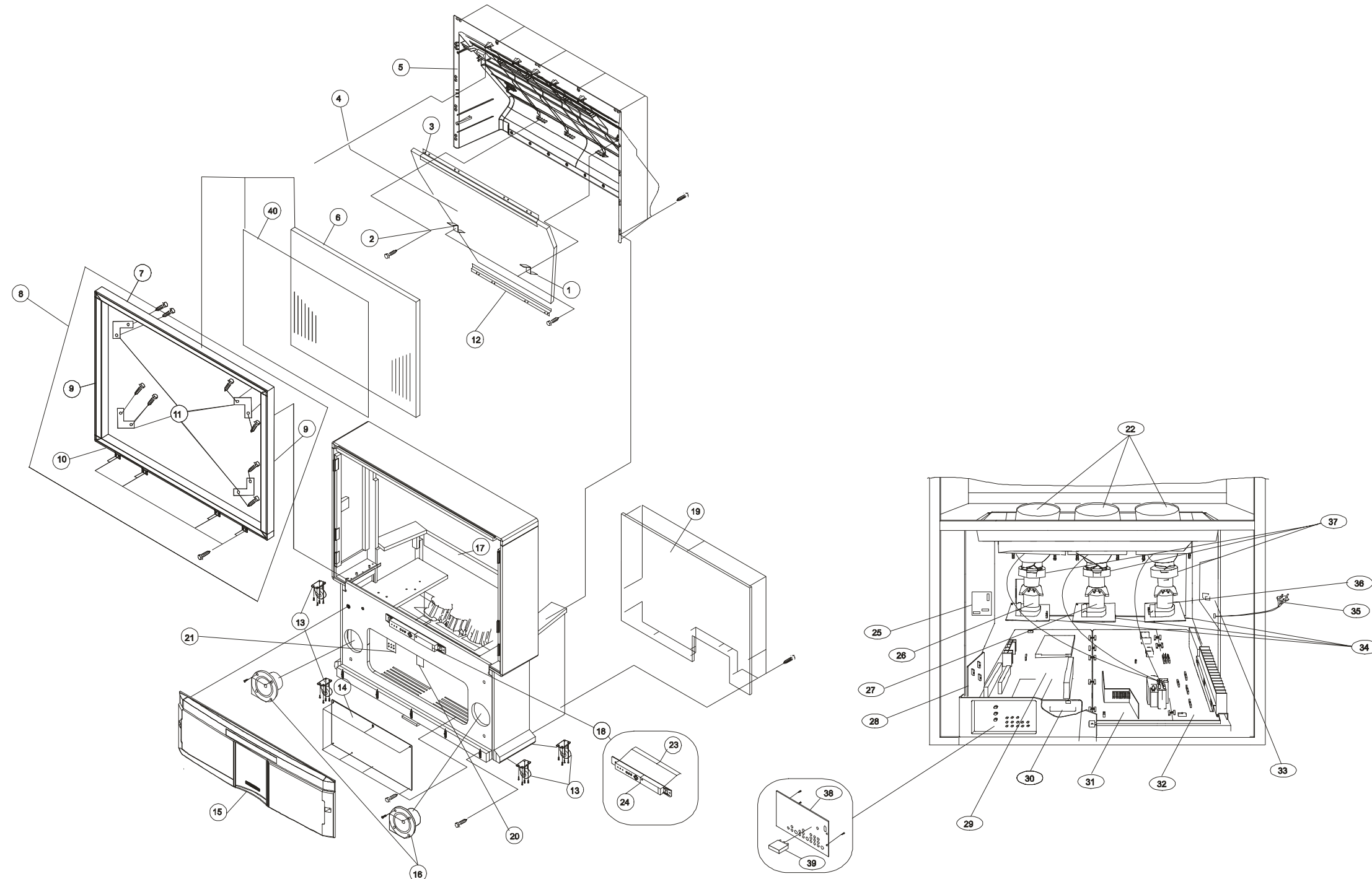
LOC	PART #	DESCRIPTION
1	NSP	MIRROR MOUNT RIGHT
2	NSP	MIRROR MOUNT LEFT
3	NSP	MIRROR MOUNT UPPER
4	992-10036	MIRROR
5	NSP	CABINET UPPER REAR
6	874-10052	SCREEN ASS. WITH PROTECTOR
7	PART OF 8	ESCUTCHEON UPPER
8	833-10024	ESCUTCHEON ASSY.
9	PART OF 8	ESCUTCHEON LEFT
10	PART OF 8	ESCUTCHEON LOWER
11	PART OF 8	ESCUTCHEON ANGLE BRACKET
12	NSP	MIRROR MOUNT LOWER
13	965-10006	CASTER
14	NSP	FRONT ACCESS COVER (WOOD)
15	809-10815	GRILL
16	849-10057	SPEAKER
17	NSP	BACK CENTER WOOD
18	809-10807	CONTROL PANEL ASY
19	814-10234	CABINET LOWER REAR
20	809-10822	VM SUB PCB
21	809-10726	CRX F-PACK
22	971-10024	DELTA (R,G,B) LENSE
23	809-10811	CONTROL POWER ASS. PWB
24	PART OF 18	FRONT BUTTON ASSY PLASTIC
25	809-10821	SCAN VELOCITY
26	900-10072	CRT B.ASY(B)
27	900-10071	CRT B.ASY(G)
28	809-10823	AUDIO PWB
29	809-10825	SIGNAL PWB
30	809-10824	TERMINAL PWB
31	809-10826	DEFLECTION PWB
32	809-10820	CONVERGENCE PWB
33	809-10844	STAND BY POWER SUPPLY
34	809-10813	CPT PWB ASY
35	845-00340	POWER CORD
36	900-10070	CRT B.ASY(R)
37	895-10143	DEFLECTION YOKE
38	NSP	REAR PORT PANEL PLASTIC
39	809-10735	RF BLOCK
40	874-10047	SCREEN PROTECTOR ONLY
	901-10023	OP GUIDE
	924-10114	REMOTE CONTROL

R65W28

LOC	PART #	DESCRIPTION
1	NSP	MIRROR MOUNT RIGHT
2	NSP	MIRROR MOUNT LEFT
3	NSP	MIRROR MOUNT UPPER
4	992-10046	MIRROR GLASS
5	NSP	BACK UPPER WOOD
6	874-10051	SCREEN ASS. WITH PROTECTOR
7	PART OF 8	ESCUTCHEON UPPER
8	814-10235	ESCUTCHEON ASS.
9	PART OF 8	ESCUTCHEON LEFT/RIGHT SIDE
10	PART OF 8	ESCUTCHEON LOWER
11	PART OF 8	ESCUTCHEON ANGLE BRACKET
12	857-10393	FRONT CENTER PANEL
13	805-10003	MAGIC FOCUS SENSOR ONLY
14	NSP	BACK CENTER WOOD
15	809-10841	SENSOR PWB
16	938-10013	GRILL
17	NSP	FRONT ACCESS COVER (WOOD)
18	849-10057	SPEAKER
19	809-10726	CRX F-PACK
20	809-10836	VM SUB PCB
21	965-10004	CASTER
22	809-10807	CONTROL PANEL ASY
23	809-10806	FRONT CONTROL PWB
24	PRT OF 22	FRONT BUTTON ASSY PLASTIC
25	NSP	LOWER REAR BOARD
26	NSP	REAR PORT PANEL PLASTIC
27	809-10735	AB RF SW ASSY
28	809-10837	AUDIO PWB
29	900-10071	CRT B.ASY(G)
30	900-10072	CRT B.ASY(B)
31	809-10835	SCAN VELOCITY
32	809-10839	SIGNAL PWB
33	809-10838	TERMINAL PWB
34	809-10840	DEFLECTION PWB
35	809-10834	CONVERGENCE PWB
36	809-10855	STAND BY POWER SUPPLY PWB
37	809-10805	ZP14C CPT PWB ASY
38	845-00340	POWER CORD
39	900-10070	CRT B.ASY(R)
40	895-10143	DEFLECTION YOKE
41	971-10024	DELTA (R,G,B) 260 A/B
42	874-10049	SCREEN PROTECTOR ONLY

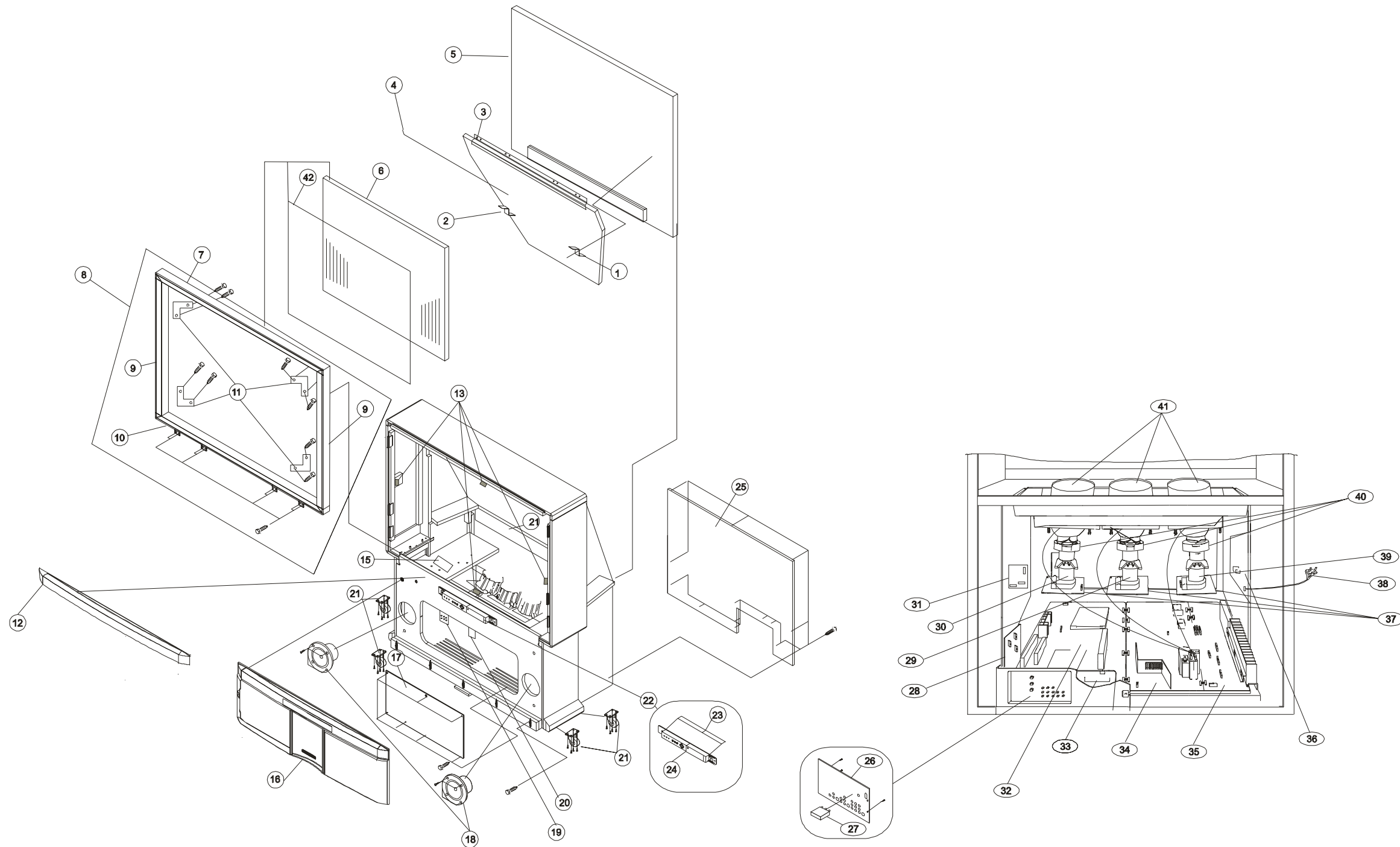
zenith 

ZP26 Exploded View



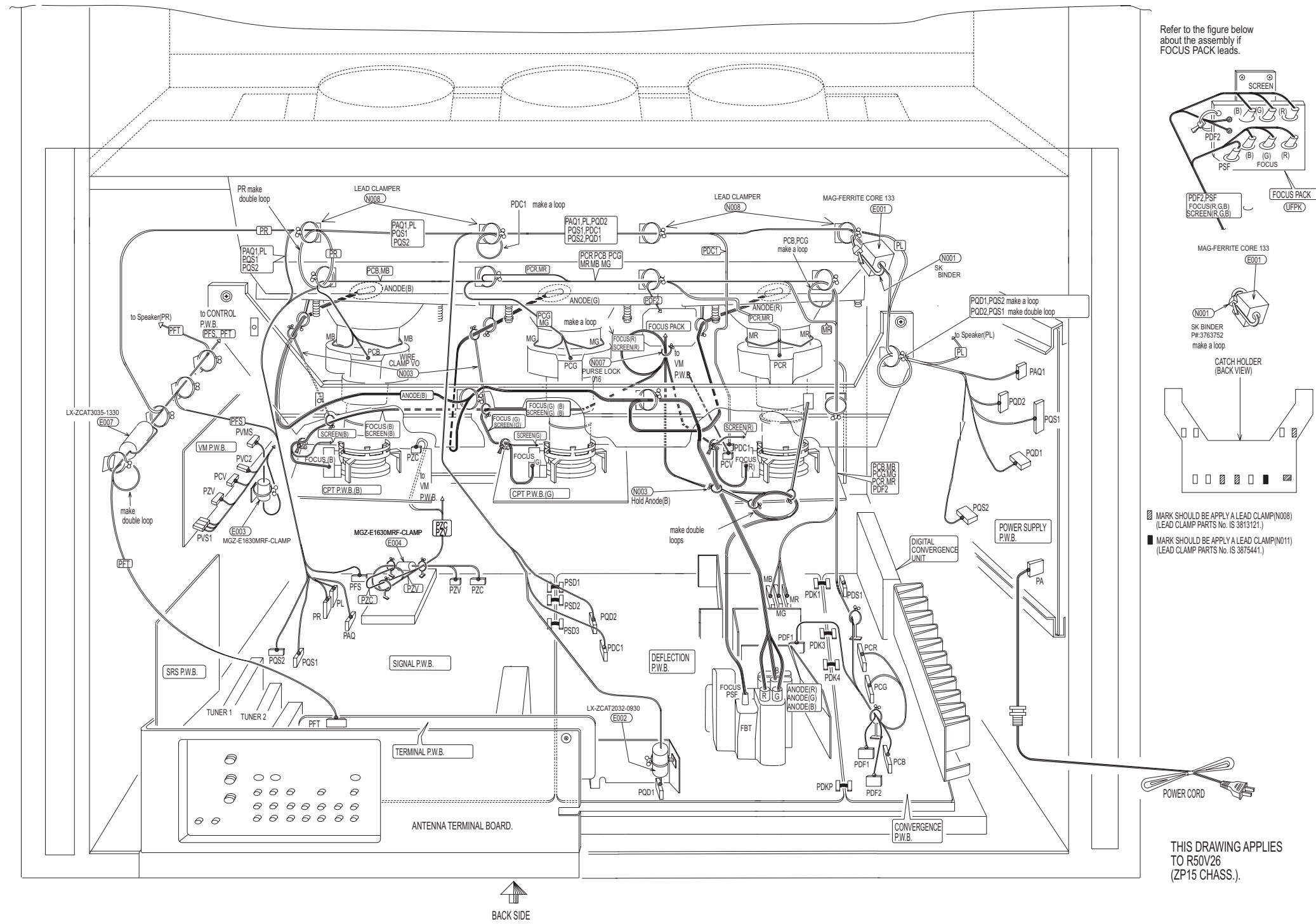
LOC	A-R60V26 B-R50B26	PART #	DESCRIPTION
1	AB	NSP	MIRROR MOUNT RIGHT
2	AB	NSP	MIRROR MOUNT LEFT
3	AB	NSP	MIRROR MOUNT UPPER
4	A	992-10036	MIRROR
4	B	992-10038	MIRROR
5	AB	NSP	CABINET UPPER REAR
6	A	874-10052	SCREEN ASS. WITH PROTECTOR
6	B	874-10046	SCREEN ASS. WITH PROTECTOR
7	AB	PART OF 8	ESCUTCHEON UPPER
8	A	833-10024	ESCUTCHEON ASSY.
8	B	833-10023	ESCUTCHEON ASSY.
9	AB	PART OF 8	ESCUTCHEON LEFT
10	AB	PART OF 8	ESCUTCHEON LOWER
11	AB	PART OF 8	ESCUTCHEON ANGLE BRACKET
12	AB	NSP	MIRROR MOUNT LOWER
13	AB	965-10006	CASTER
14	AB	NSP	FRONT ACCESS COVER (WOOD)
15	B	809-10810	GRILL
15	A	809-10815	GRILL
16	B	849-10055	SPEAKER
16	A	849-10057	SPEAKER
17	AB	NSP	BACK CENTER WOOD
18	AB	809-10807	CONTROL PANEL ASY
19	A	814-10234	CABINET LOWER REAR
19	B	814-10236	CABINET LOWER REAR
20	AB	809-10822	VM SUB PCB
21	AB	809-10726	CRX F-PACK
22	B	809-10814	DELTA (R,G,B) LENSE
22	A	971-10024	DELTA (R,G,B) LENSE
23	AB	809-10811	CONTROL POWER ASS. PWB
24	AB	PART OF 18	FRONT BUTTON ASSY PLASTIC
25	AB	809-10821	SCAN VELOCITY
26	AB	900-10072	CRT B.ASY(B)
27	AB	900-10071	CRT B.ASY(G)
28	AB	809-10823	AUDIO PWB
29	AB	809-10825	SIGNAL PWB
30	AB	809-10824	TERMINAL PWB
31	AB	809-10826	DEFLECTION PWB
32	AB	809-10820	CONVERGENCE PWB
33	AB	809-10844	STAND BY POWER SUPPLY
34	AB	809-10813	CPT PWB ASY
35	AB	845-00340	POWER CORD
36	AB	900-10070	CRT B.ASY(R)
37	AB	895-10143	DEFLECTION YOKE
38	AB	NSP	REAR PORT PANEL PLASTIC
39	AB	809-10735	RF BLOCK
40	B	874-10054	SCREEN PROTECTOR ONLY
40	A	874-10047	SCREEN PROTECTOR ONLY
	AB	901-10023	OP GUIDE
	AB	924-10114	REMOTE CONTROL

ZP28 Exploded View

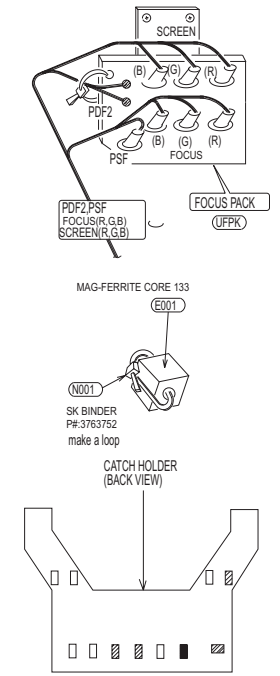


LOC	A-R56W28 B-R65W28	PART #	DESCRIPTION
1	AB	NSP	MIRROR MOUNT RIGHT
2	AB	NSP	MIRROR MOUNT LEFT
3	AB	NSP	MIRROR MOUNT UPPER
4	B	992-10046	MIRROR GLASS
4	A	992-10047	MIRROR GLASS
5	AB	NSP	BACK UPPER WOOD
6	B	874-10051	SCREEN ASS. WITH PROTECTOR
6	A	874-10050	SCREEN ASS. WITH PROTECTOR
7	AB	PART OF 8	ESCUTCHEON UPPER
8	B	814-10235	ESCUTCHEON ASS.
8	A	814-10257	ESCUTCHEON ASS.
9	AB	PART OF 8	ESCUTCHEON LEFT/RIGHT SIDE
10	AB	PART OF 8	ESCUTCHEON LOWER
11	AB	PART OF 8	ESCUTCHEON ANGLE BRACKET
12	AB	857-10393	FRONT CENTER PANEL
13	AB	805-10003	MAGIC FOCUS SENSOR ONLY
14	AB	NSP	BACK CENTER WOOD
15	AB	809-10841	SENSOR PWB
16	B	938-10013	GRILL
16	A	938-10014	GRILL
17	AB	NSP	FRONT ACCESS COVER (WOOD)
18	B	849-10057	SPEAKER
18	A	849-10055	SPEAKER
19	AB	809-10726	CRX F-PACK
20	AB	809-10836	VM SUB PCB
21	AB	965-10004	CASTER
22	AB	809-10807	CONTROL PANEL ASY
23	AB	809-10806	FRONT CONTROL PWB
24	AB	PRT OF 22	FRONT BUTTON ASSY PLASTIC
25	AB	NSP	LOWER REAR BOARD
26	AB	NSP	REAR PORT PANEL PLASTIC
27	AB	809-10735	AB RF SW ASSY
28	AB	809-10837	AUDIO PWB
29	AB	900-10071	CRT B.ASY(G)
30	AB	900-10072	CRT B.ASY(B)
31	AB	809-10835	SCAN VELOCITY
32	AB	809-10839	SIGNAL PWB
33	AB	809-10838	TERMINAL PWB
34	AB	809-10840	DEFLECTION PWB
35	AB	809-10834	CONVERGENCE PWB
36	AB	809-10855	STAND BY POWER SUPPLY PWB
37	AB	809-10805	ZP14C CPT PWB ASY
38	AB	845-00340	POWER CORD
39	AB	900-10070	CRT B.ASY(R)
40	AB	895-10143	DEFLECTION YOKE
41	AB	971-10024	DELTA (R,G,B) 260 A/B
42	B	874-10049	SCREEN PROTECTOR ONLY
42	A	874-10048	SCREEN PROTECTOR ONLY
	AB	206-03282	OP GUIDE
	AB	924-10098	REMOTE CONTROL

50" Wiring Diagram - Back



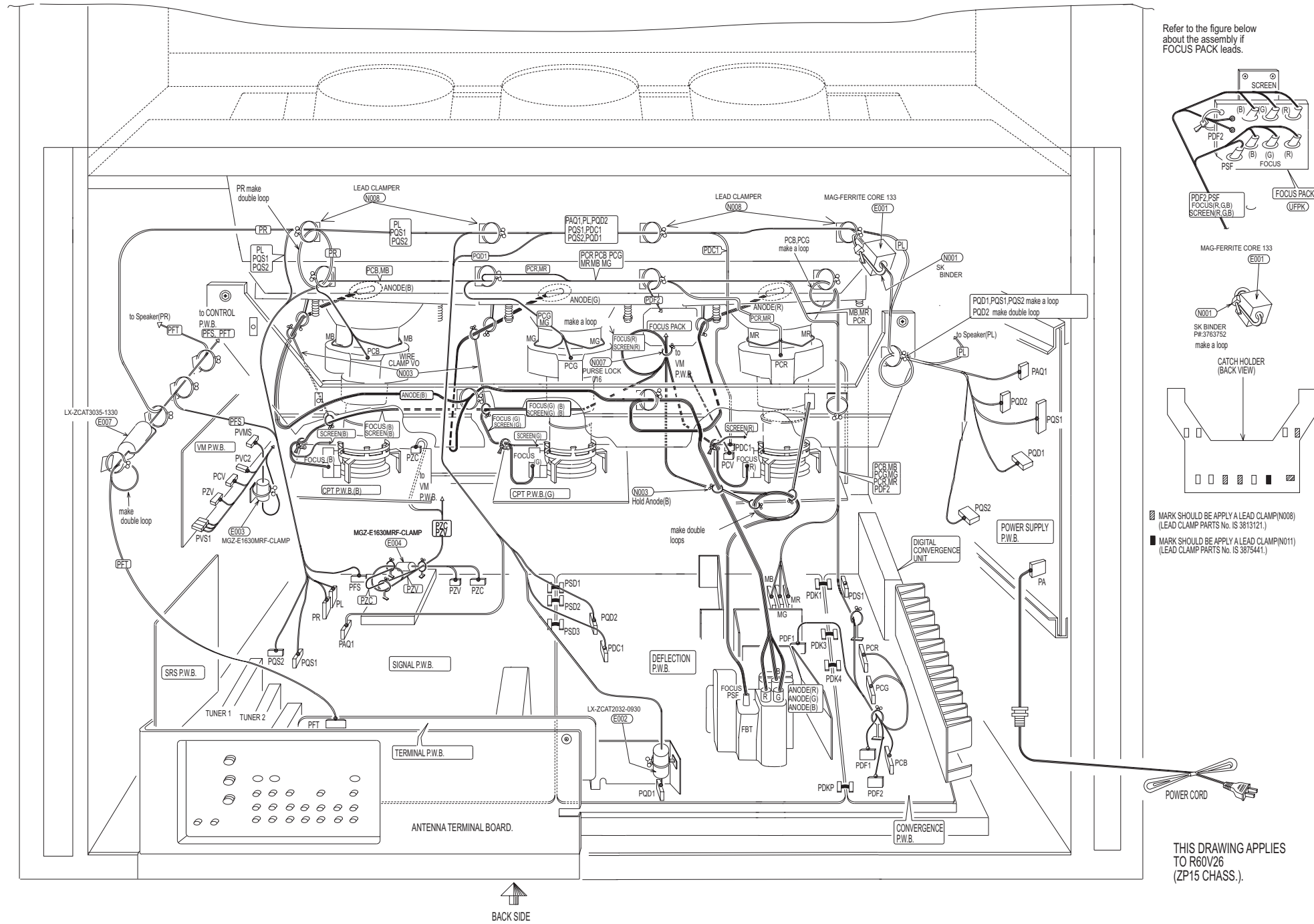
Refer to the figure below about the assembly if FOCUS PACK leads.



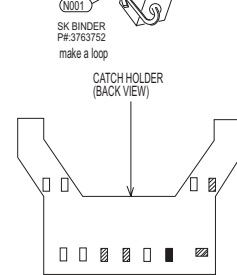
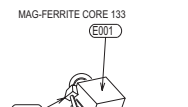
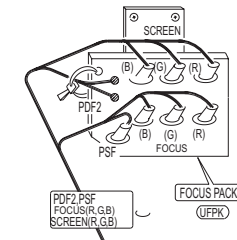
MARK SHOULD BE APPLY A LEAD CLAMP(N008) (LEAD CLAMP PARTS No. IS 3813121.)
 MARK SHOULD BE APPLY A LEAD CLAMP(N011) (LEAD CLAMP PARTS No. IS 3875441.)

THIS DRAWING APPLIES TO R50V26 (ZP15 CHASS.).

60" Wiring Diagram - Back



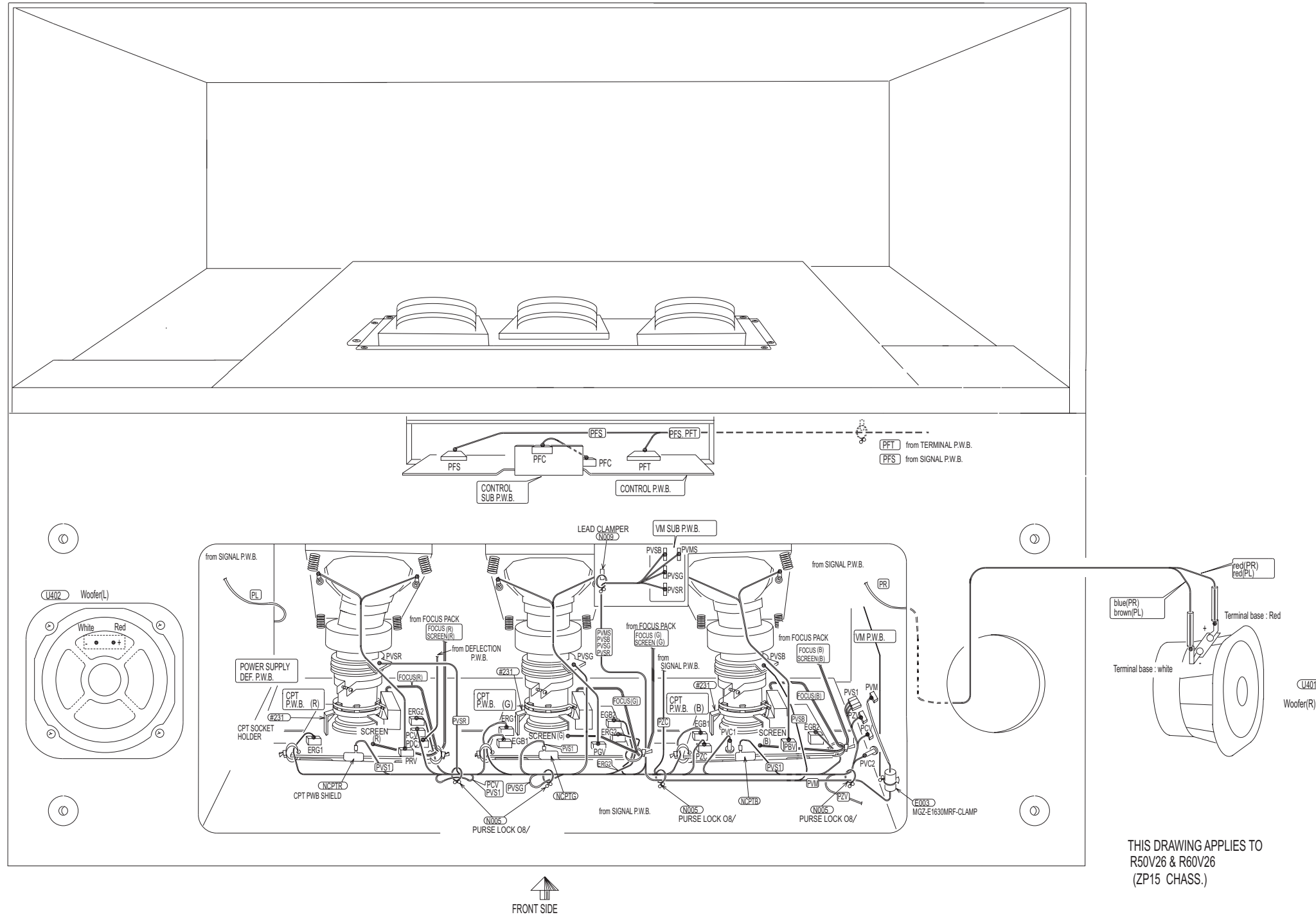
Refer to the figure below about the assembly if FOCUS PACK leads.



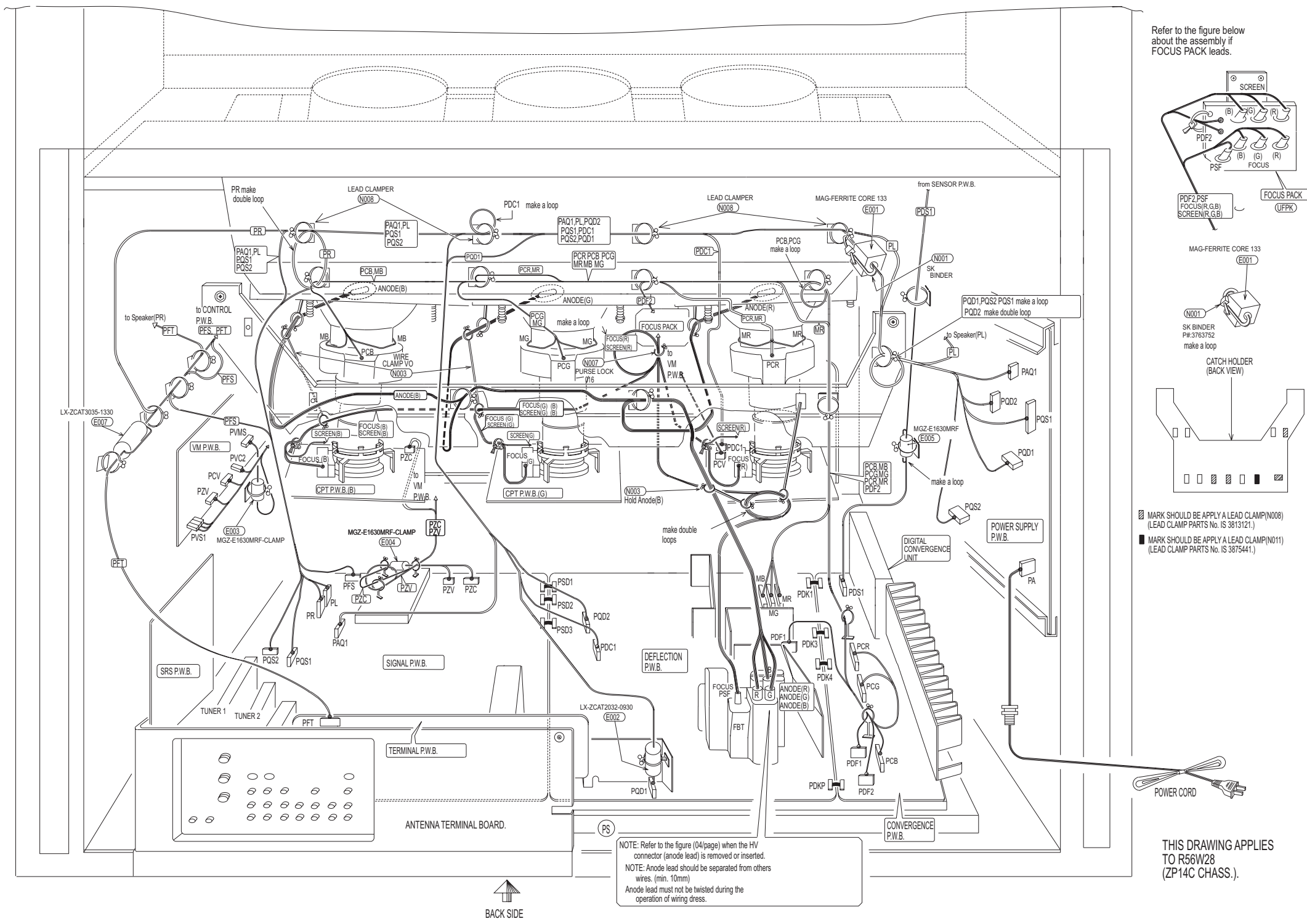
■ MARK SHOULD BE APPLY A LEAD CLAMP(N008)
 (LEAD CLAMP PARTS No. IS 3813121).
 ■ MARK SHOULD BE APPLY A LEAD CLAMP(N011)
 (LEAD CLAMP PARTS No. IS 3875441).

THIS DRAWING APPLIES TO R60V26 (ZP15 CHASS.).

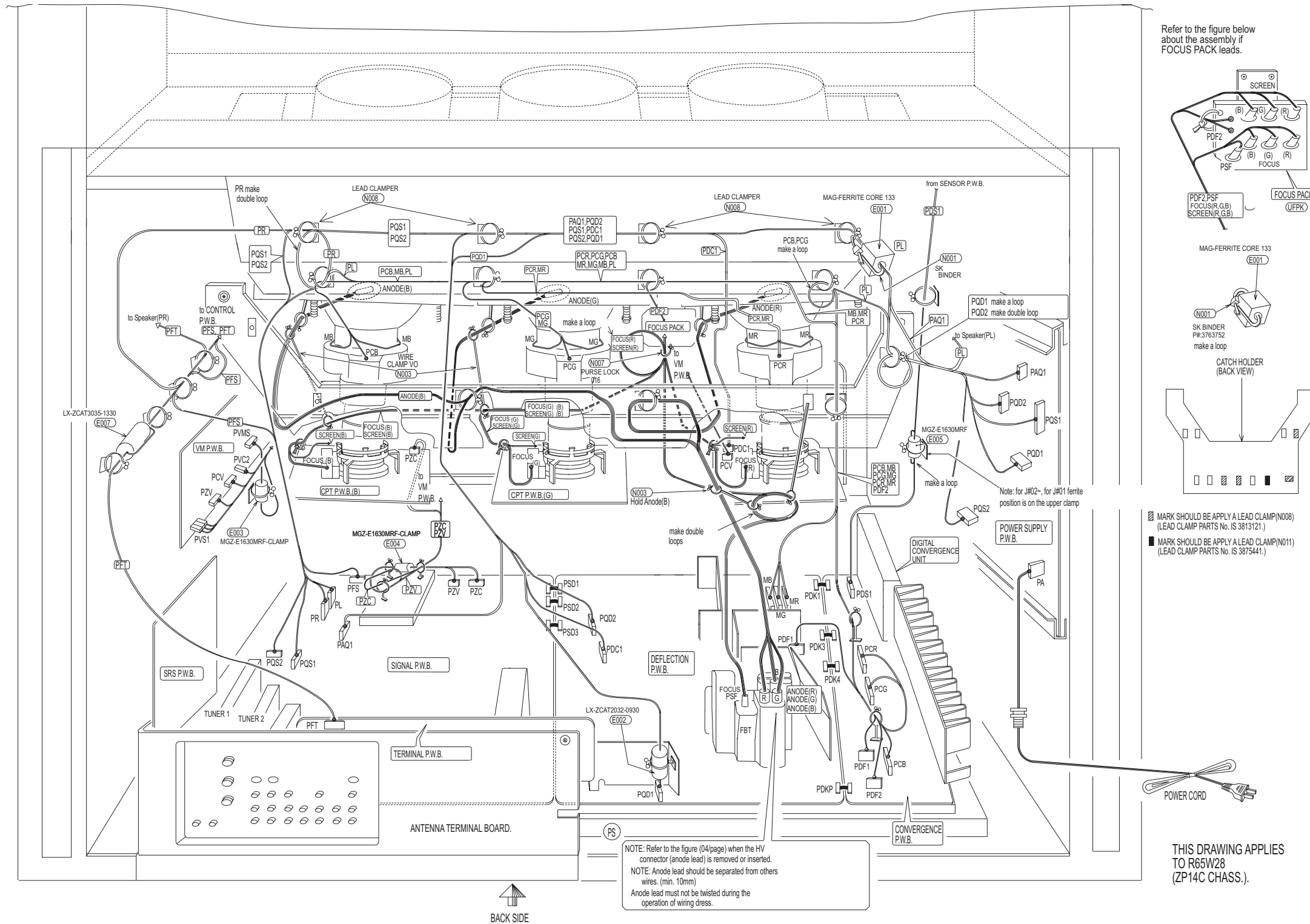
50/60" Wiring Diagram - Front



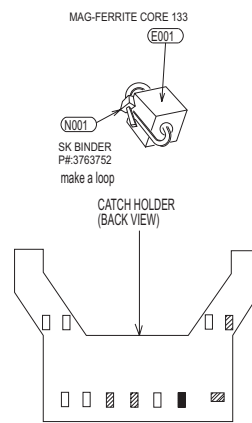
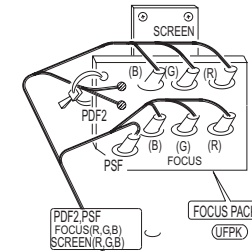
56" Wiring Diagram - Back



65" Wiring Diagram - Back



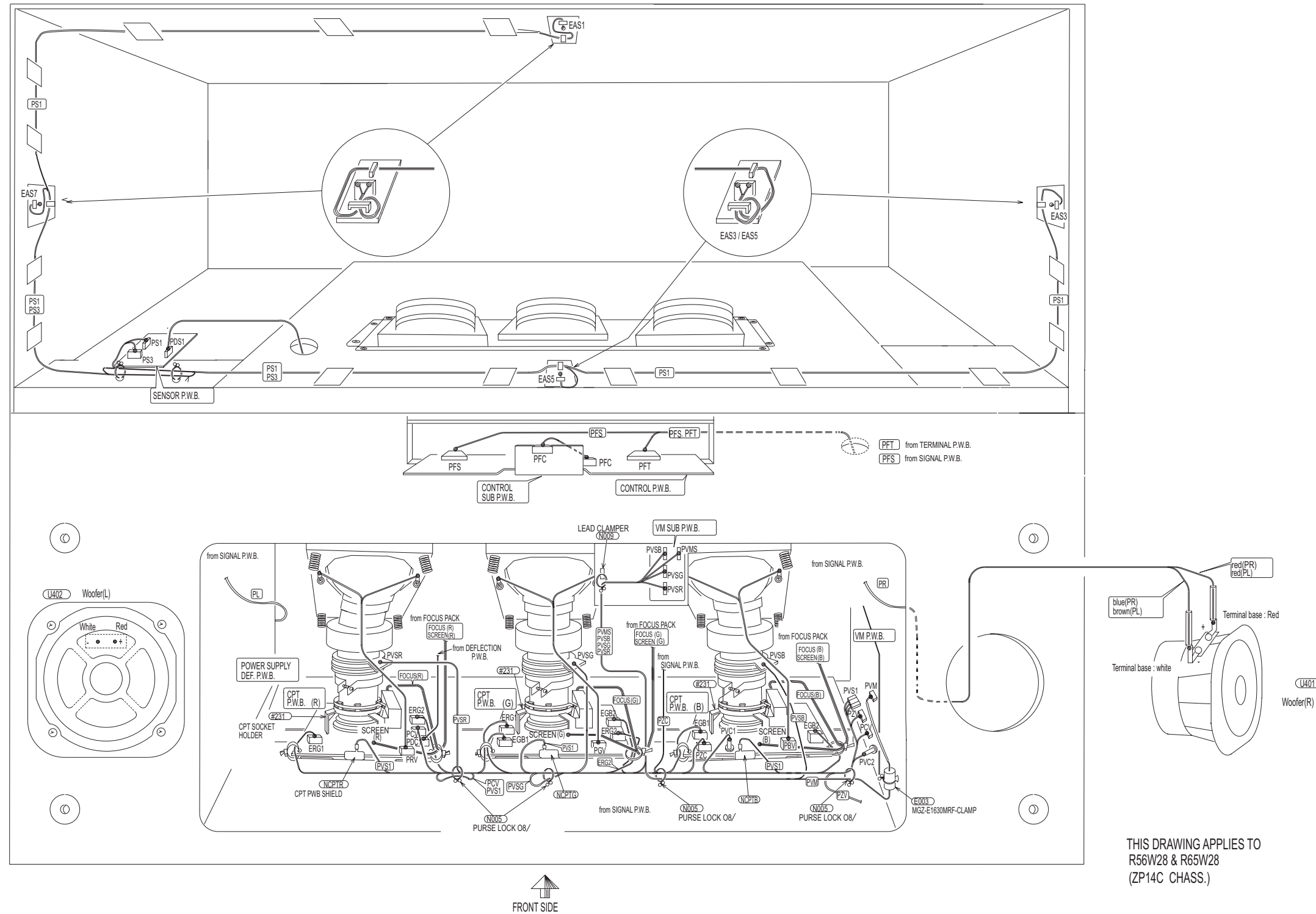
Refer to the figure below about the assembly if FOCUS PACK leads.



 MARK SHOULD BE APPLY A LEAD CLAMP(N008) (LEAD CLAMP PARTS No. IS 3813121.)
 MARK SHOULD BE APPLY A LEAD CLAMP(N011) (LEAD CLAMP PARTS No. IS 3875441.)

THIS DRAWING APPLIES TO R65W28 (ZP14C CHASS.).

56/65" Wiring Diagram - Front



Convergence Circuit 1/2

1

2

3

4

5

6

7

8

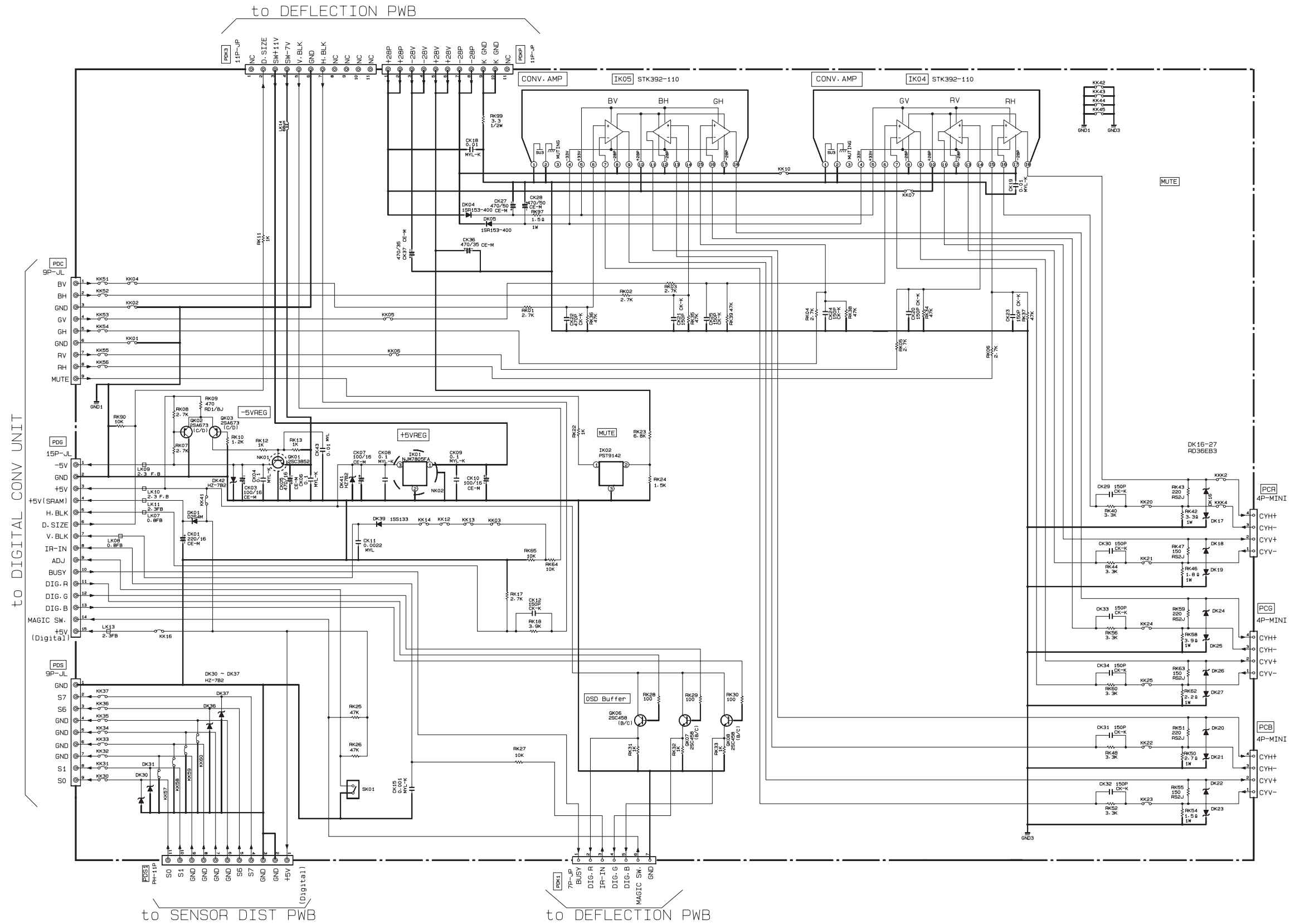
G

F

E

D

C



CRITICAL SAFETY COMPONENTS ARE IDENTIFIED BY THE SYMBOL REPLACE ONLY WITH PART NUMBERS SPECIFIED.

Convergence Circuit 2/2

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8

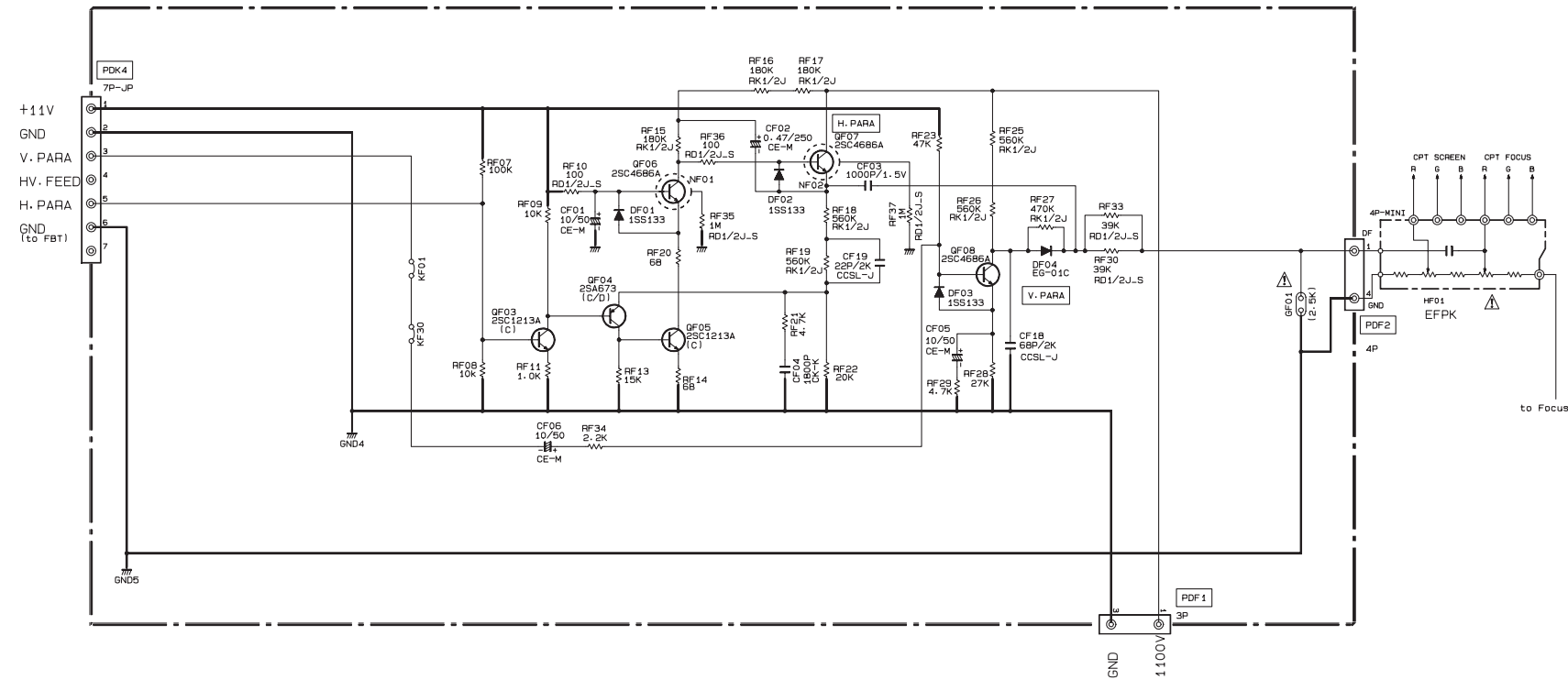
G

F

E

D

C



CRITICAL SAFETY COMPONENTS ARE IDENTIFIED BY THE SYMBOL .
REPLACE ONLY WITH PART NUMBERS SPECIFIED.

Magic Focus Circuit

1

2

3

4

5

6

7

8

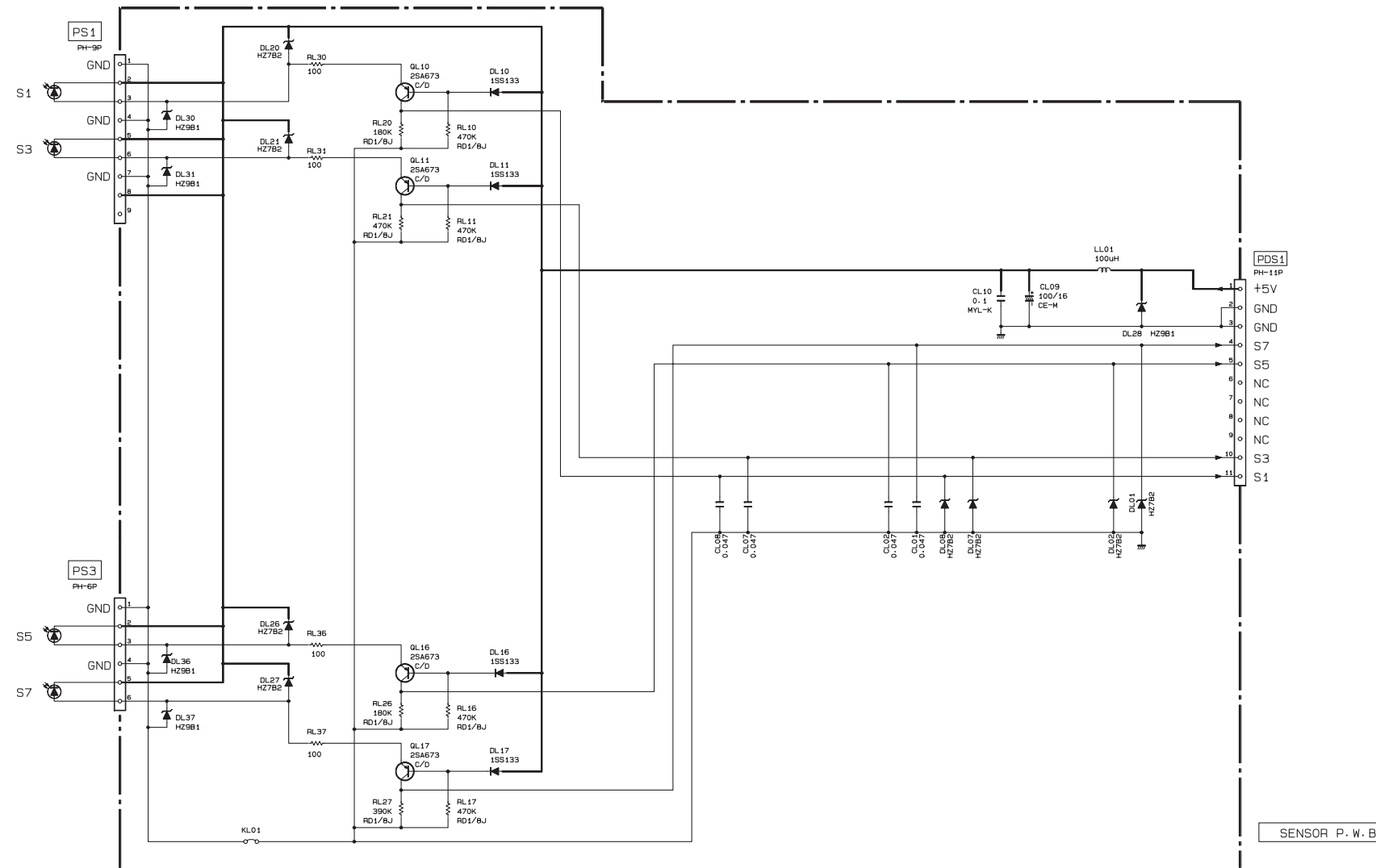
G


F

E

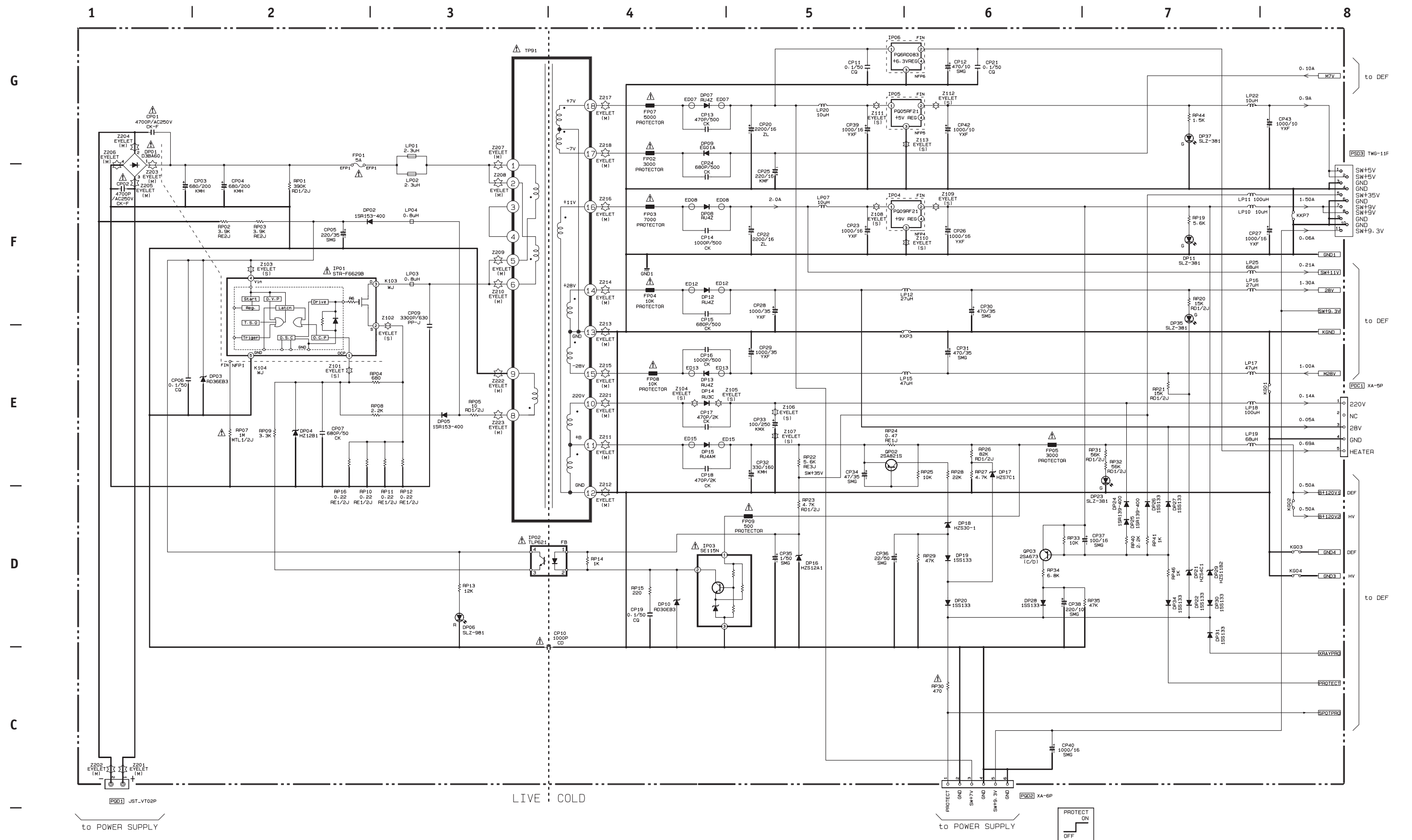
D

C



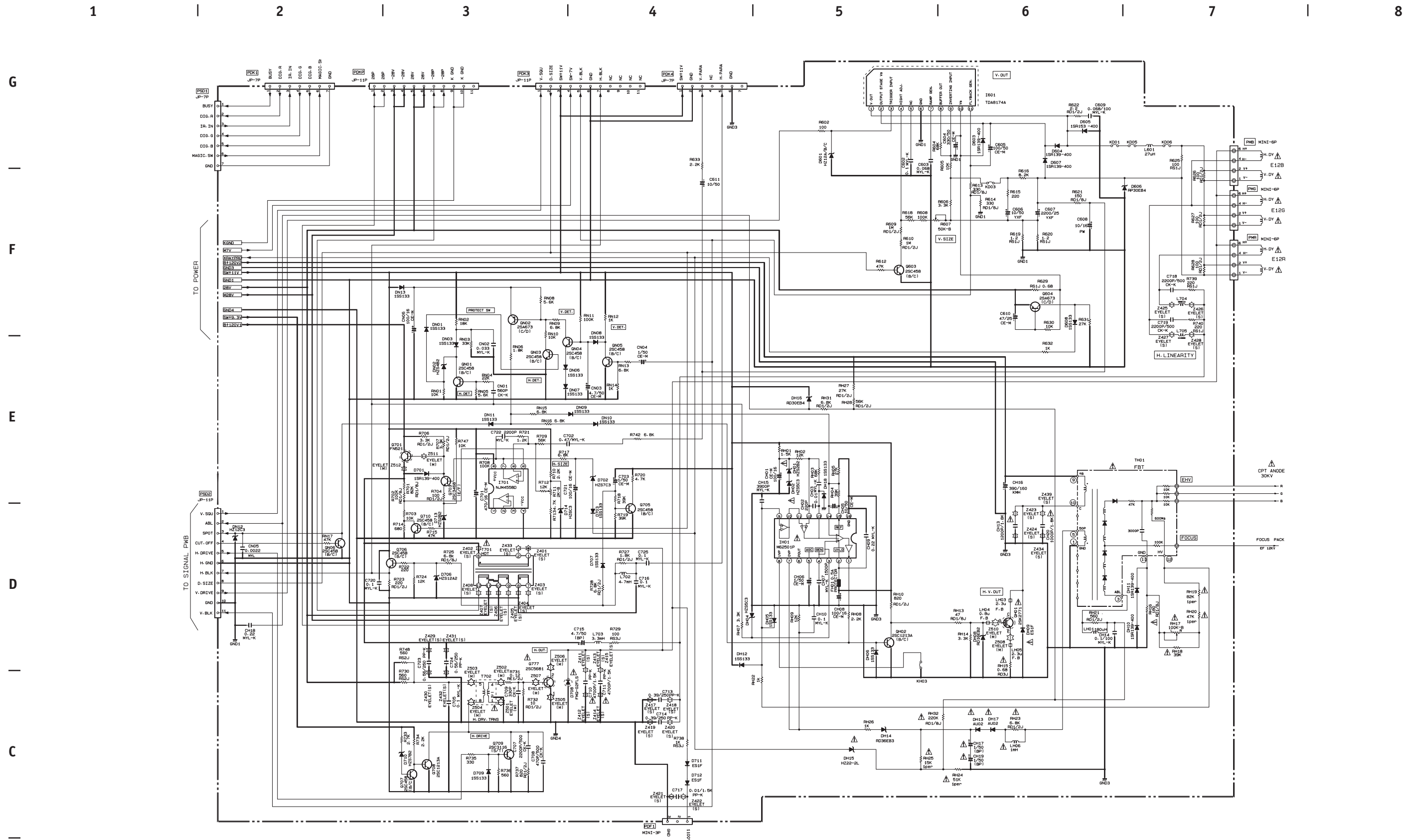
CRITICAL SAFETY COMPONENTS ARE IDENTIFIED BY THE SYMBOL . REPLACE ONLY WITH PART NUMBERS SPECIFIED.


Deflection Power Supply Circuit



CRITICAL SAFETY COMPONENTS ARE IDENTIFIED BY THE SYMBOL . REPLACE ONLY WITH PART NUMBERS SPECIFIED.

Deflection Circuit



 CRITICAL SAFETY COMPONENTS ARE IDENTIFIED BY THE SYMBOL . REPLACE ONLY WITH PART NUMBERS SPECIFIED.

Power Supply Circuit

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8

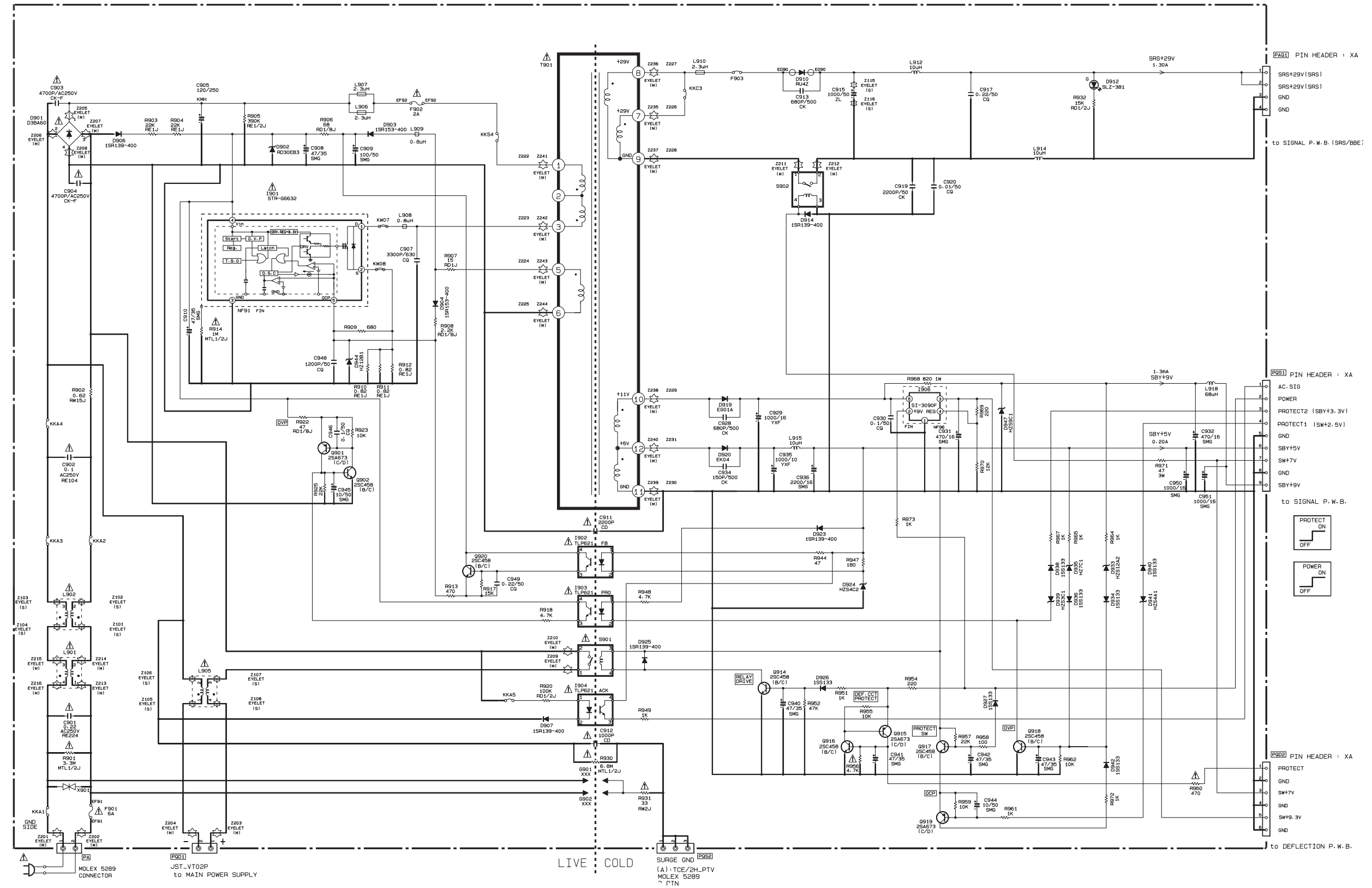
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CRITICAL SAFETY COMPONENTS ARE IDENTIFIED BY THE SYMBOL REPLACE ONLY WITH PART NUMBERS SPECIFIED.

Signal Circuit 1/4

1

2

3

4

5

6

7

8

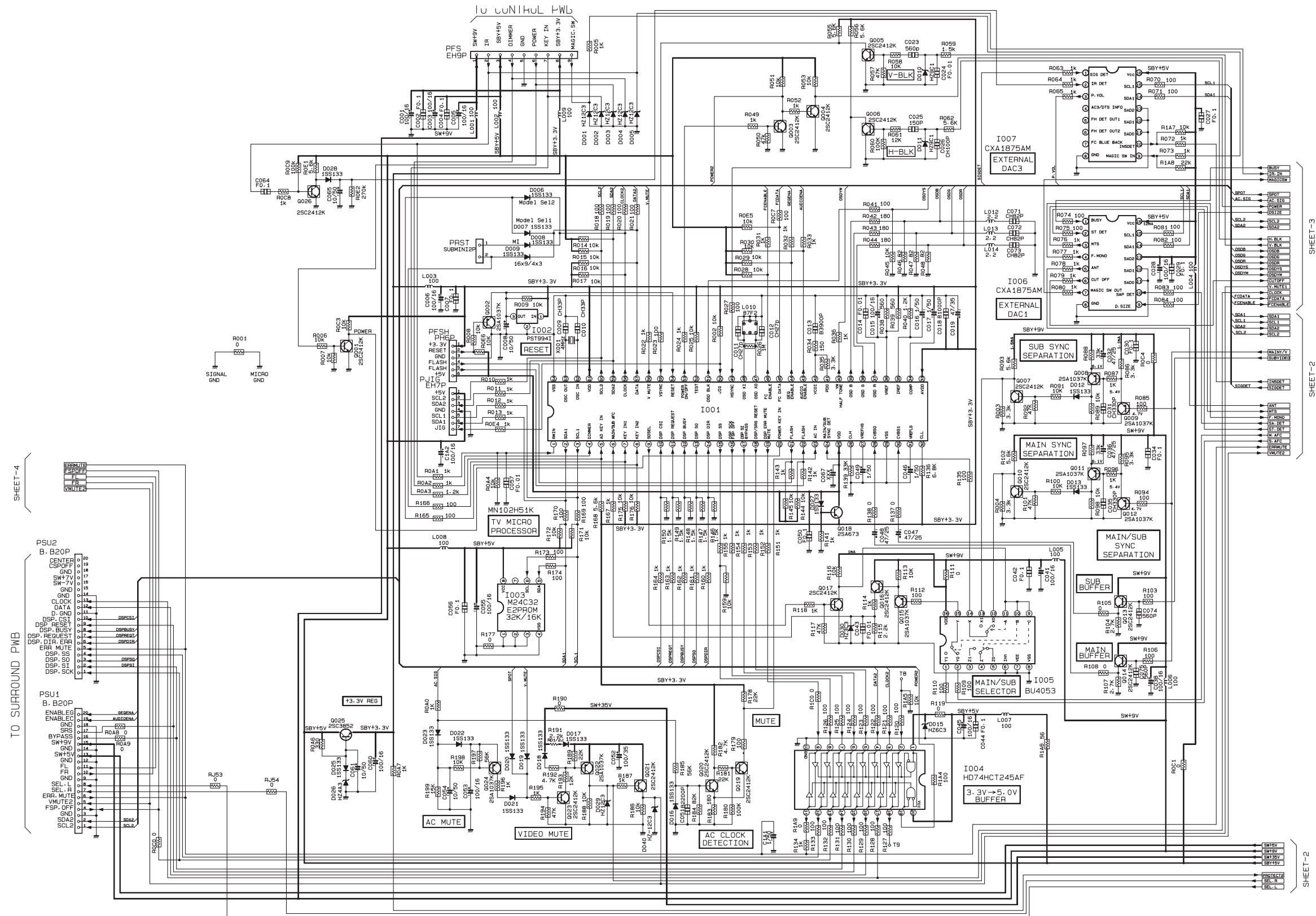
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C



SHEET-4


TO SURROUND PWB

SHEET-3

SHEET-2

SHEET-2



CRITICAL SAFETY COMPONENTS ARE IDENTIFIED BY THE SYMBOL . REPLACE ONLY WITH PART NUMBERS SPECIFIED.

Signal Circuit 2/4

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8

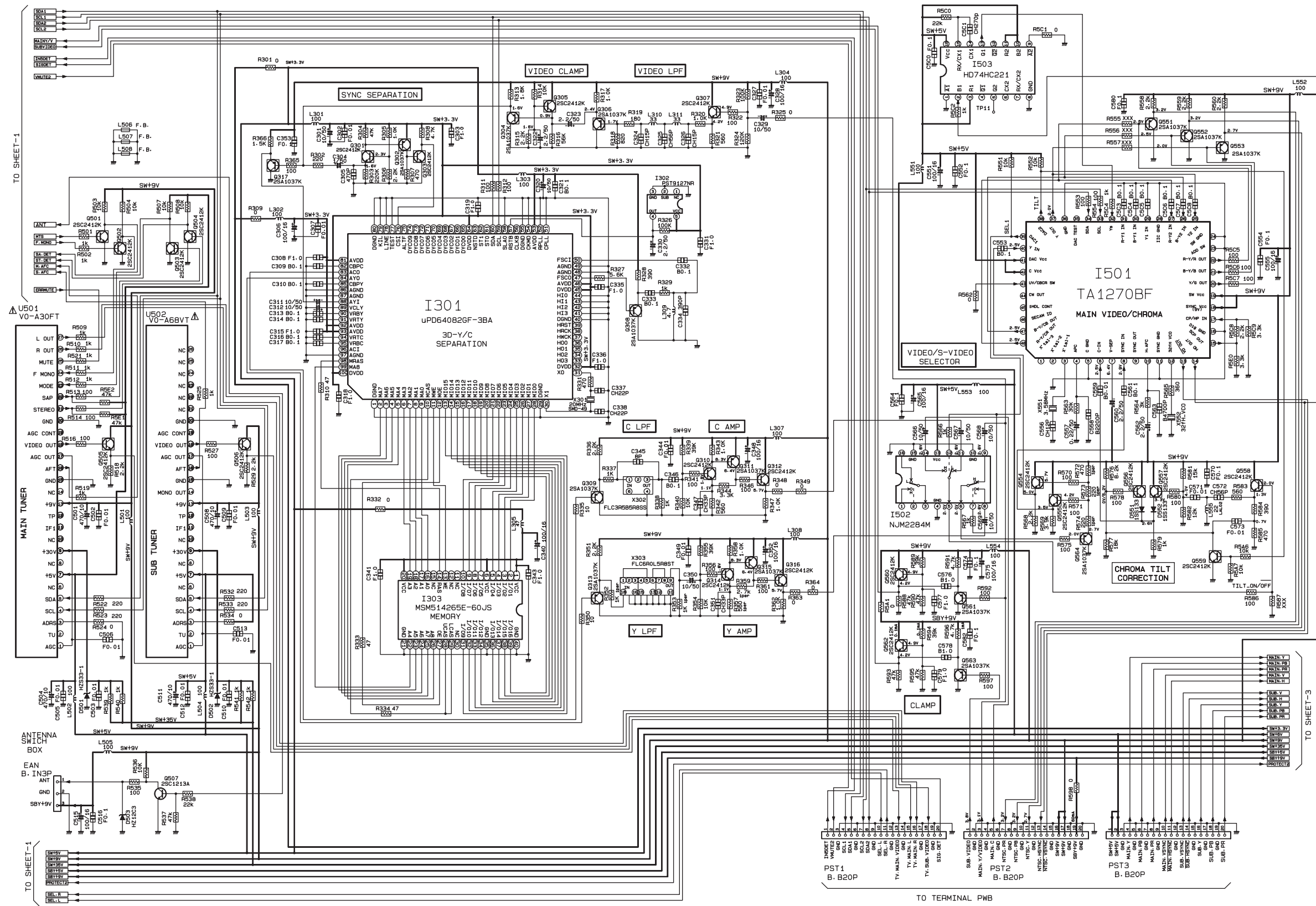
G

F

E

D

C



Signal Circuit 3/4

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8

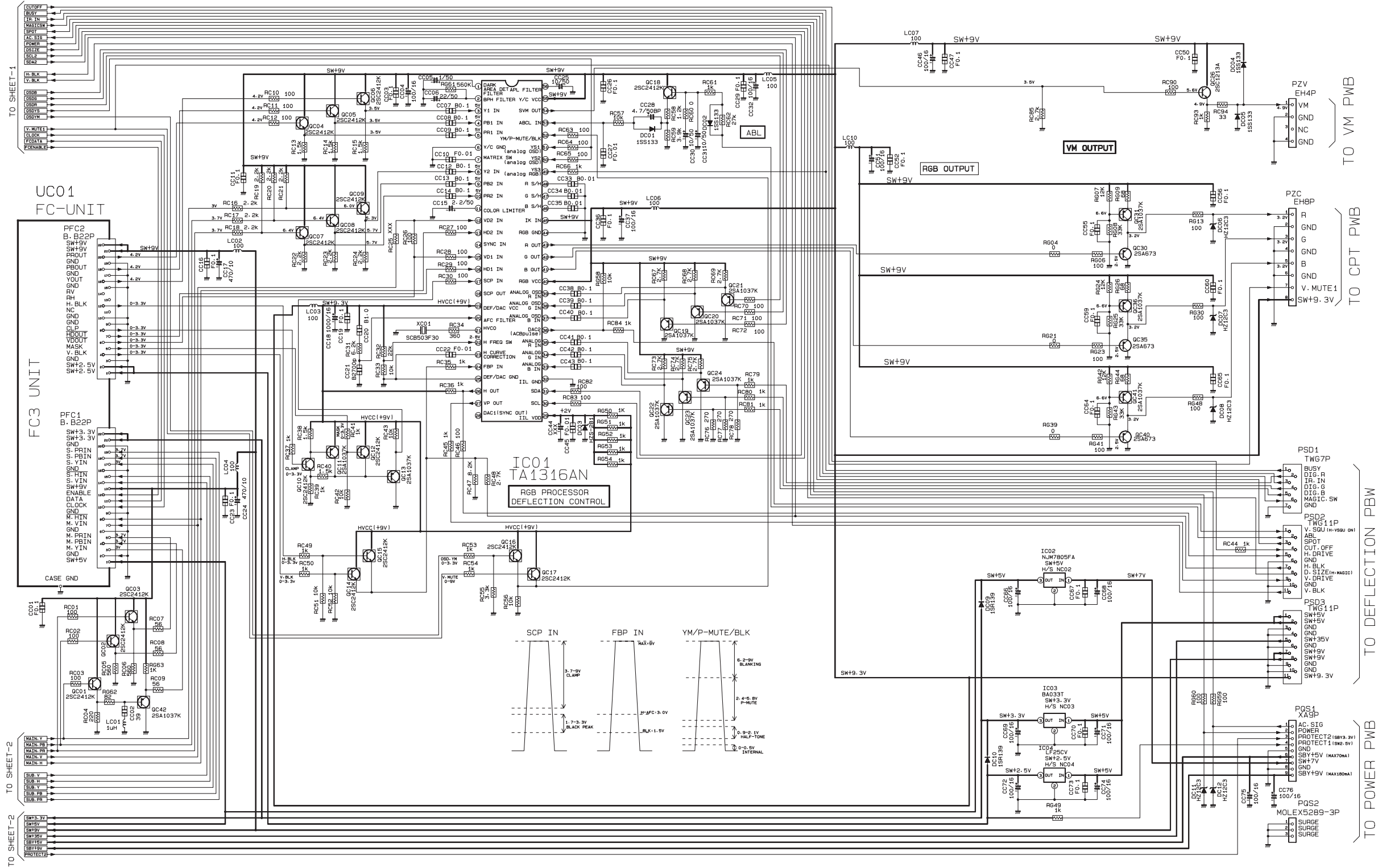
G

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C



CRITICAL SAFETY COMPONENTS ARE IDENTIFIED BY THE SYMBOL . REPLACE ONLY WITH PART NUMBERS SPECIFIED.

Signal Circuit 4/4

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8

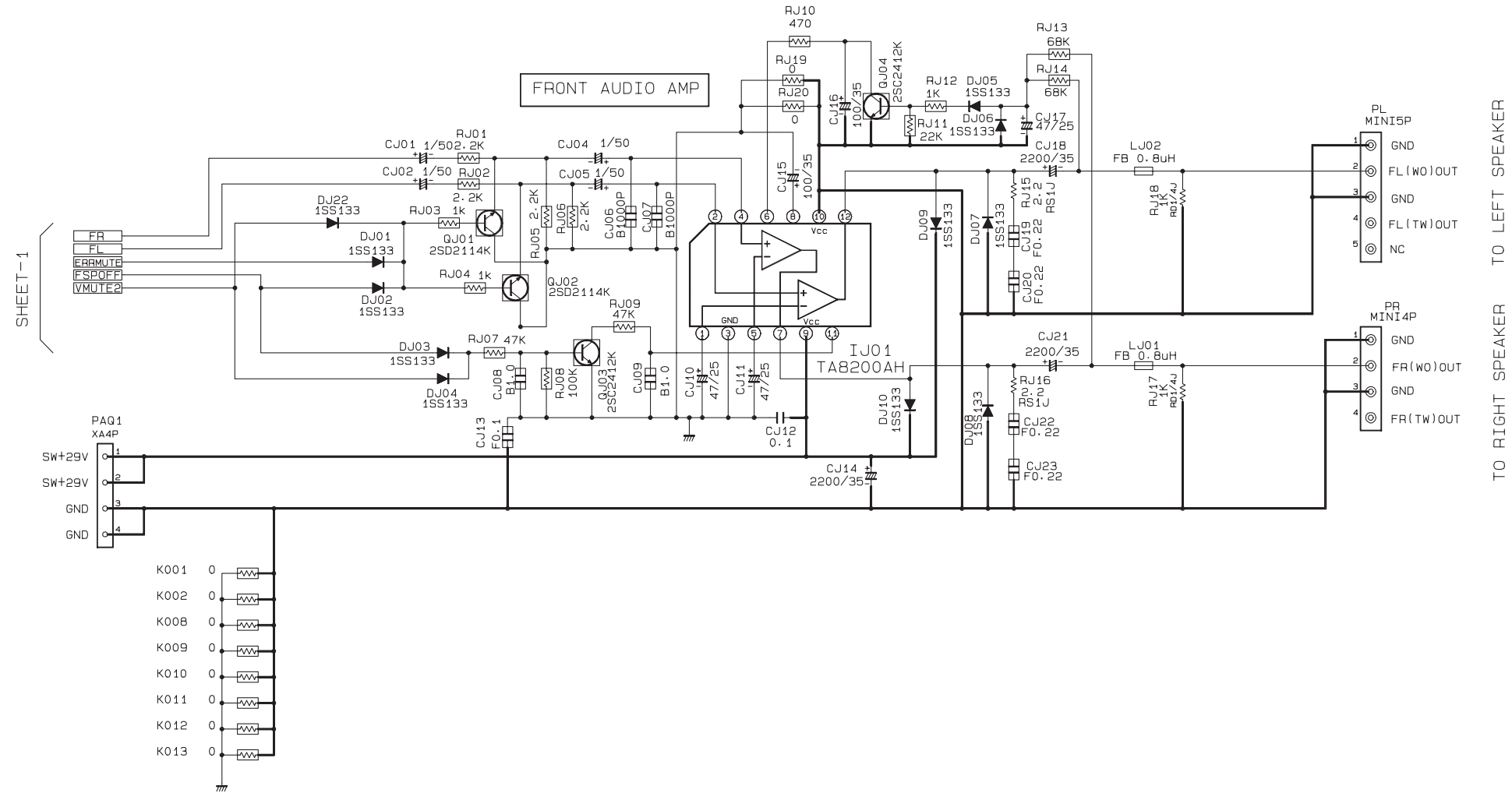
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C



TO LEFT SPEAKER
TO RIGHT SPEAKER



CRITICAL SAFETY COMPONENTS ARE IDENTIFIED BY THE SYMBOL .
REPLACE ONLY WITH PART NUMBERS SPECIFIED.

SRS Circuit

1

2

3

4

5

6

7

8

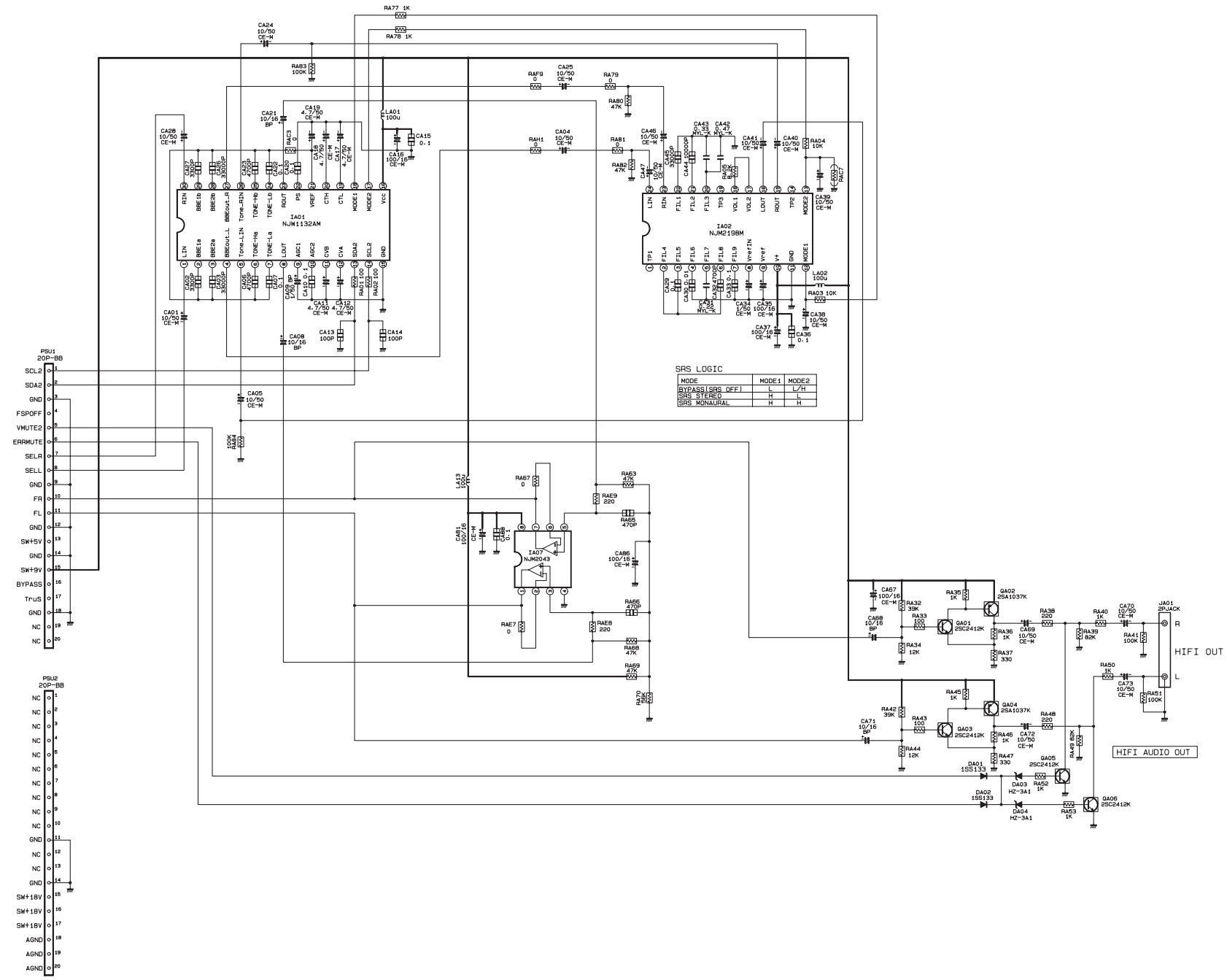
G


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E

D

C



CRITICAL SAFETY COMPONENTS ARE IDENTIFIED BY THE SYMBOL . REPLACE ONLY WITH PART NUMBERS SPECIFIED.

Velocity Modulator Circuit

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8

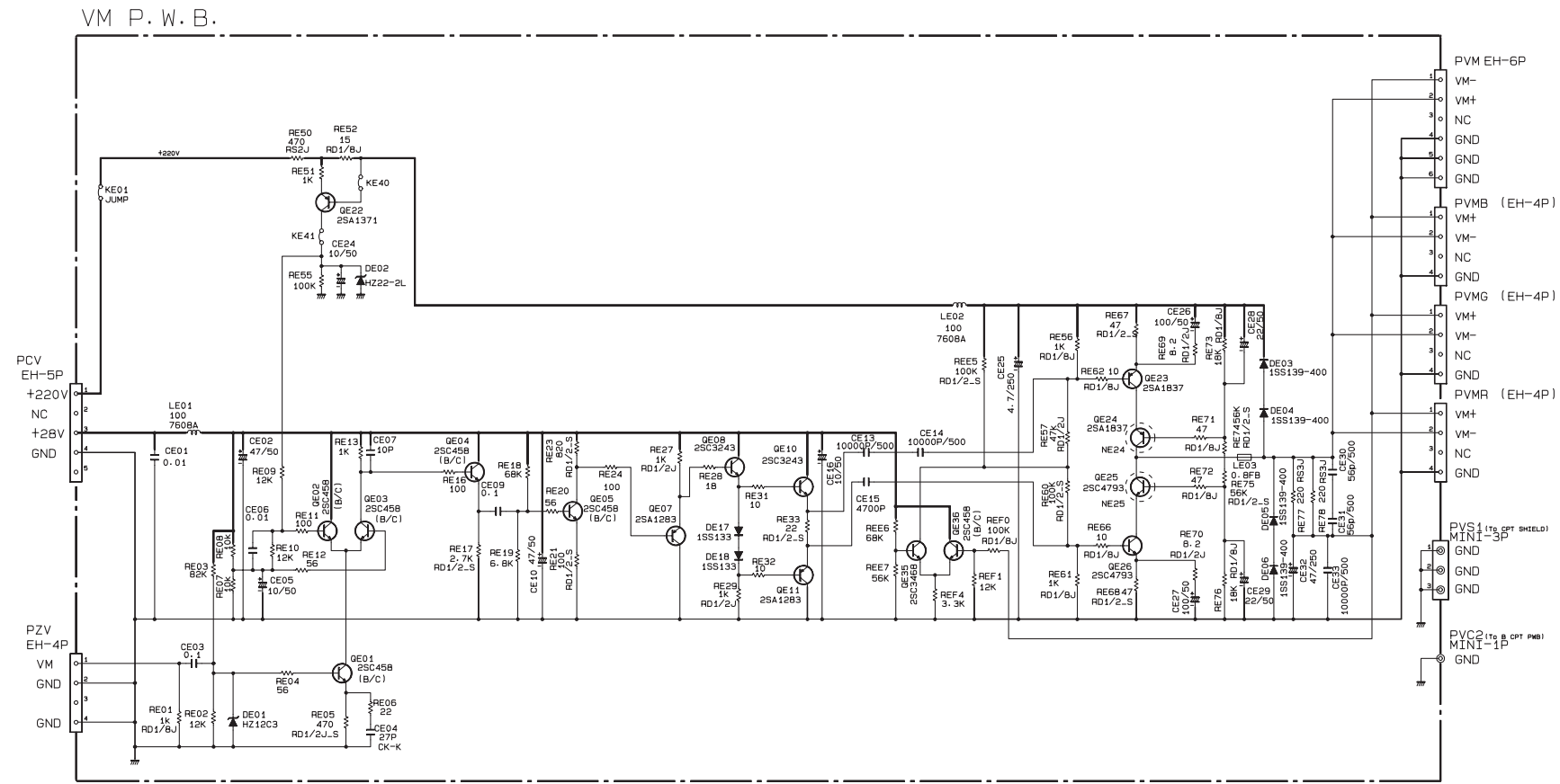
G

F

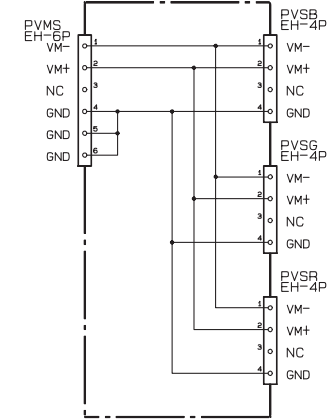
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VM SUB P. W. B.



CRITICAL SAFETY COMPONENTS ARE IDENTIFIED BY THE SYMBOL .
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